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APRIL 1950

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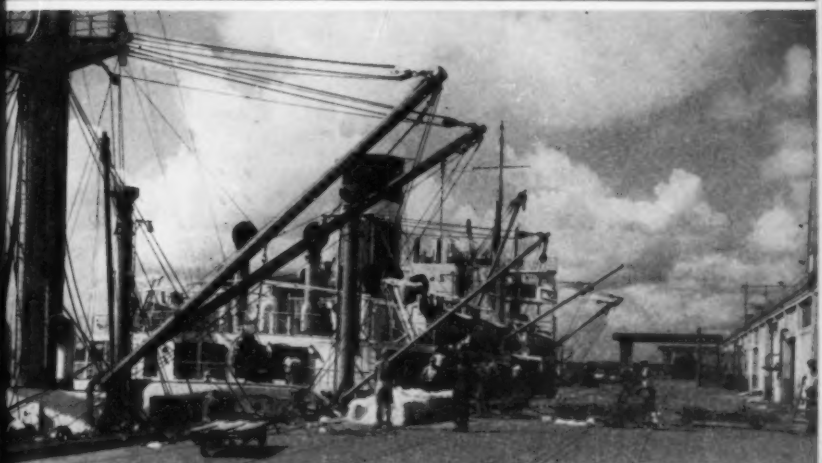

Foreign-Trade Zones Help You Enter the American Markets

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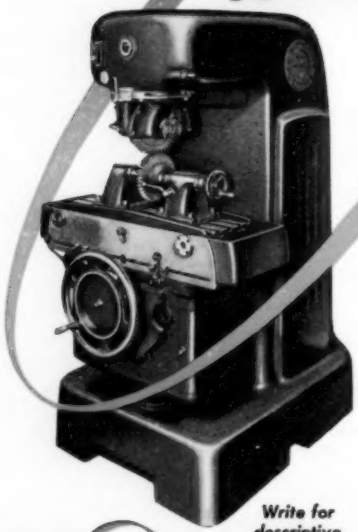
SHAVING ASSURES BETTER GEARS AT A GREATER OVER-ALL

Production Economy



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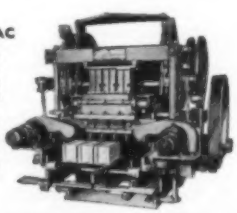

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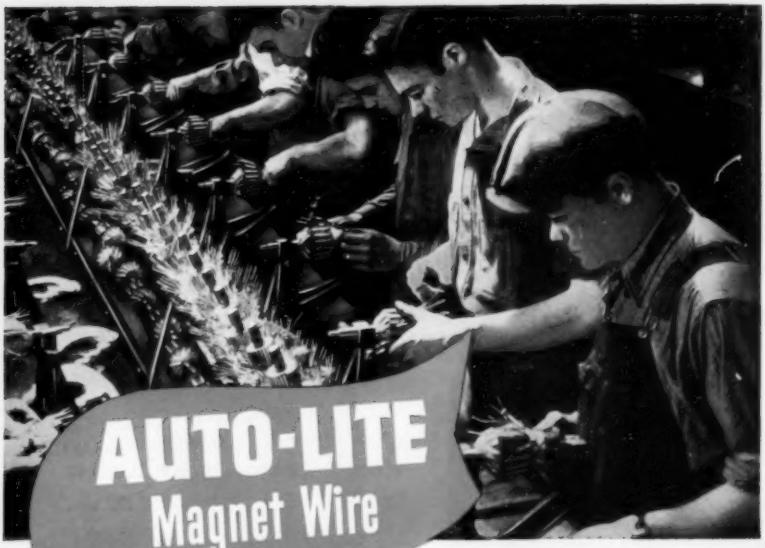

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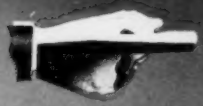

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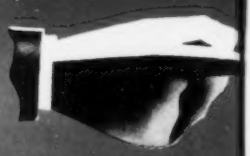

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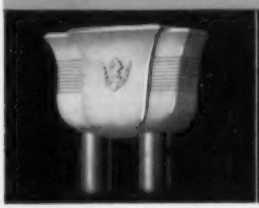

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Business Trends

BUSINESS PROSPERITY continued in the United States during the first months of 1950 in spite of major strikes. Overall business activity was some 12% higher than in the post-war low of last summer. The Federal Reserve Board's Index of Industrial Production was close to the level attained at the beginning of 1949, which was a prosperous period.

Construction, one of the sturdy props of the American economy, is booming. Home-building activity last January was at the highest January level on record—60% above the corresponding month of 1949. And new building permits are being issued at unseasonably high rates; this means a continued building boom for at least several months.

The steel industry operated at a high rate before the coal strike curbed its output. Automobile production was close to record levels—in spite of a strike at Chrysler that stopped production of more than 30,000 units a week. But this production is not lost, but only deferred to later in the year.

The textile industry recovered rapidly after its severe setback in 1949. By mid-winter, production of textiles was within 5% of the 1948 peak.

Electric power continued its steady advance. The weekly output at the beginning of 1950 averaged more than 4% above the level in early 1949.

Some important segments of the American economy were not operating anywhere near capacity. Transportation industries—with the exception of automobiles—operated at lower levels than in 1949. Demand for coal and for petroleum products was low, partly because of unusual warm winter weather. But on the average, business in the U. S. was good.

Unemployment reached a post-war high in spite of general business prosperity —about 4.5-million during the early winter months. It usually reaches a peak in winter, when there are fewer farm jobs.

Main reason for mounting unemployment now is that economic activity has not kept pace with population increases. The labor force has increased about 1.2-million in the past year while business activity is slightly below last year's level. But the current level of unemployment is still far from dangerous.

EFFECTS OF DEVALUATION on world price relationships have been estimated by the International Monetary Fund. On the average, U. S. goods have become 16% more costly to the customers in other parts of the world while foreign wares in the U. S. have become about 13% cheaper.

Price changes were smaller than were expected at the time of the devaluation. Britain, however, gained important price advantages over the U. S. on the world market. Since devaluation, British pig iron and coal are cheaper than U. S.

Business Trends (Continued)

products. Also, as a result of devaluation, Canadian and Australian wheat now undersells American wheat.

VENEZUELAN IRON RUSH is big news for the American industrial community. After World War II it seemed as though American mills were going to run out of high-grade ore within 10 to 20 years. Some firms began to feel the pinch in 1947 and '48. Now, Venezuelan discoveries, supplemented by prospective supplies from Labrador, insure enough high-grade ore to last for decades.

Venezuelan deposits valued at about $10-billion have been leased by U. S. Steel Corp., the largest American steel manufacturer. The deposit includes about 1,300-million tons of high-grade ore. It was discovered after a multi-million dollar search of three continents.

To get the ore out, U. S. Steel will have to invest hundreds of millions, perhaps as much as $1-billion. Plans call for installing mining machinery, constructing blast furnaces, and building the necessary transportation system. Ore will be refined on the spot, and pig iron shipped to the U. S. First shipments are expected 5 years from now.

Discovery of new iron deposits is equally important to the U. S. and Venezuela: To the U. S., the deposits mean a steady supply of iron and steel. To Venezuela, the discoveries spell a more diversified economy and development of the country. Royalties will provide dollars for needed purchases in the U. S. And U. S. Steel will build a railroad, highways, and steel mills.

TURKEY'S LOAN from the World Bank may set a new pattern of aid to underdeveloped areas. The planned loan will help establish a bank to finance private enterprise in Turkey. Until now, all Turkish banks have been government-owned.

The $10-million loan will be matched by a like amount raised in Turkey from both government and private sources. The bank will be privately managed. World Bank's contribution of only one half of necessary funds follows the usual pattern of its loans—to help those that help themselves.

The Turkish loan has two unique features that may well set a precedent:

1. The loan is extended to a bank, and not for a specific project.
2. The loan will help establish private enterprise in a country in which all enterprise has been concentrated in the hands of government.

U. S. TECHNICAL KNOW-HOW will help build a new city in India. The capital city of Province of Punjab, Lahore, was given to Pakistan in the partition last year. Now the provincial government has engaged an American city planner to build a new city in a bare Ganges valley. The city's population is to reach 150,000 in 5 years, and 500,000 ultimately.

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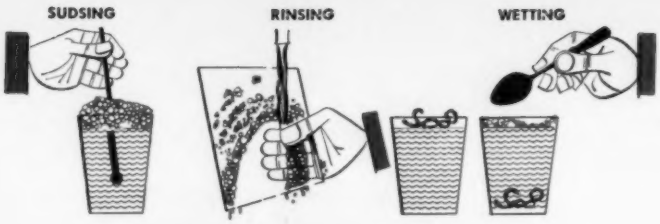

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Washington Report

WHICH WAY TO PEACE? Washington is far from agreed on that all important point. Sentiment for a dramatic meeting with Russia is growing. The H-bomb announcement touched it off. Vote-conscious congressmen are taking up the cry for another "talk with Joe." Even some of the more worldly wise legislators are urging the direct approach—Senators McMahon and Tydings.

The State Dept. is gently but firmly trying to quiet such talk. Secretary Acheson believes that any attempt to get agreement with Russia now could only lead to disillusionment and might send the U. S. back into armed isolation. That would leave Stalin free to further his conquests in Europe and Asia.

Acheson's Russian policy is based on strength first and agreement second. In his own words, the policy is, "To create situations so strong that out of them agreement can grow." That is why he is backing Tito in Yugoslavia, looking for another "Tito" in China, arming the French in Indo-China.

President Truman has backed up his Secretary of State so far, but political pressure in an election year will make his position difficult. Reports from Moscow that Stalin is ready for another talk will keep the pressure up. State Dept. officials tend to regard these reports as proof that Stalin feels he could further his ends with a paper agreement now. Whether State Dept. can get this point of view across to the Congress and the people is open to question. State may finally have to risk another conference with Stalin if only to get the money from Congress to carry out Acheson's new policy.

ANOTHER BRITISH FINANCIAL CRISIS is expected this summer by some top U. S. officials. They feel that the hard decisions that should have been made with devaluation last fall still remain to be made. Reduced dollar earnings from the new pound rate may make this summer's crisis worse than last.

Talk of another British loan is encouraged by this dreary prediction. Officials deny them, but rumors persist of a new loan, tied to a reduction of Britain's sterling balances. Presumably, the loan money would go for food and development materials for Britain's big creditors, particularly India.

More likely this year is a loan to replace the $4-billion debt that Britain owes the U. S. for the 1947 loan. Payments begin next year. There is no hope that Britain can meet them. So a new loan—perhaps extending over 100 years and bearing no interest—might be made to replace the debt.

DO NOT TAKE PROTECTIONIST TALK in Congress too seriously. National-security interests and old-line high-tariff advocates are stressing the possible dangers. That is natural now that postwar shortages in the U. S. are gone. And it is an indication of ECA's failure to work miracles in Western Europe. But

Washington Report (Continued)

the administration's policy of encouraging imports is not yet threatened. The test will come when Congress realizes that western nations will have to discriminate against U. S. imports for a long time after 1952.

Within the administration there is a real fight over freer trade policies. The Agriculture Dept.'s crazy-quilt farm-support program and the heavily subsidized U. S. merchant marine have seriously embarrassed ECA's crusade for freer trade in Western Europe. Both ECA and the State Dept. are trying to bring both these departments into line with U. S. foreign-trade policy. But neither ECA nor State command any votes so their cause is hopeless.

WORLD BANK has about 20 projects before it that stand good chances of getting loans over the next year and a half. At the top of the list are:

Uruguay—About $30-million for improvement of electric-power and telephone facilities.

Brazil—A still undetermined amount for the state-owned Paulo Alfonso hydroelectric project. (Export-Import Bank will extend a further credit to the Volta Redonda steel plant this year.)

Colombia—Less than $10-million for three small hydroelectric projects at Anchicaya, Lebrija, and Balsora.

India—$25-million for the Bokoro-Konar power projects in the Damodar River valley.

Yugoslavia—The much talked of loan to Tito should come to a head this month or early next. Meanwhile, Export-Import Bank has granted a second $20-million to Tito; the first $20-million was approved last September.

EXPORT-IMPORT BANKS loans to service private U. S. investments abroad are being mentioned as another Point Four stimulant. If Congress authorizes the bank to guarantee private U. S. investments overseas, this should be possible.

Brazil brought up the idea. The Brazilians would like to set up a hard-currency fund in the U. S. from which U. S. investors could draw their profits and dividends in dollars. Some of the money would come from Brazil's earnings on current trade. The rest, Brazil hopes, would come from the bank.

FOOD GIVEAWAY PROGRAMS are going to get a lot of support in Congress before the year is out. With a 390-million bu. wheat surplus expected by July and another bumper harvest in sight for this year, some action seems certain.

Congress would like to make Britain buy its wheat here under the Marshall Plan. But that is impossible. Under the International Wheat Agreement, Britain is committed to buy virtually all its wheat in Canada and Australia. So other means of getting rid of the surplus will have to be worked out. Countries most likely to get U. S. wheat in one way or another are Iran and India.

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CITY AND COUNTRY_____

Harshaw industrial chemicals FOR EXPORT

CERAMIC
- Ceramic Colors
- Uverite (Opacifier)
- Antimony Oxide
- Tin Oxide
- Chrome Oxide Green
- Cadmium Sulfide
- Porcelain Enamel Frits

PAINT, VARNISH, AND PLASTIC
- Driers And Other Metallic Soaps
- Cadmium Lithopones
- Antimony Oxide
- Chrome Oxide

ELECTROPLATING
- Nickel Salts:
  - Sulfate, Chloride, and Carbonate
- Cadmium Oxide

CATALYTIC PROCESSING
- Aluminum Chloride Anhydrous
- Antimony Trichloride
- Boron Trifluoride
- Boron Fluoride Etherate
- Hydrofluoric Acid
- Nickel Formate

MISCELLANEOUS
- Hydrofluoric Acid
- Ammonium Bifluoride
- Miscellaneous Fluorides
- Synthetic Optical Crystals
- Copper Naphthenate
- Copper Oxychloride Sulfate
- Cobalt Sulfate And Carbonate

WRITE FOR CATALOG
This 32-page book alphabetically lists all chemicals available and describes Harshaw's major activities.

HARSHAW

THE HARSHAW CHEMICAL COMPANY
Export Division
CLEVELAND 6, OHIO
CABLE ADDRESS: HARSHAW-CLEVELAND

April 1950 • McGraw-Hill DIGEST • Volume 5 Number 4

TYPICAL U. S. PORT (at Los Angeles) has at lower center a no-man's land of trade

Foreign-Trade Zones Help You Enter the American Markets

Two-way profitable trade between your country and the U. S. is a world necessity. Foreign-trade zones can help make your trade easier, cheaper

PUERTO RICAN RUM bound for the Orient. That was the first shipment to arrive at the foreign-trade zone of San Francisco. And more followed for import into the United States, because the West Coast had long been undeveloped for the sale of rum. So the producer stockpiled it in the zone to back up his new efforts to distribute his product in the West and to solicit more sales in the Pacific.

Canned pineapple from Formosa is a familiar sight at the Seattle foreign-trade zone. There it is inspected and labeled to conform to U. S. laws—all without interference from U. S. Customs.

Watch movements from Switzerland and watch cases and bands from the U. S. meet in the foreign-trade zone in New Orleans. There they are assembled and brought into the U. S. with duty paid only on the watch movements. Or they go on—to Latin America or to the Orient—no duty, no bother, no fuss with U. S. Customs.

Wool hooked rugs came from China—800 bales in the largest shipment ever to reach an American port. Stored in the San Francisco zone, bales are opened for inspection and selection by prospective buyers. As each sale is made, that lot alone goes through customs.

The world market place for the tobacco of Sumatra and Java is in New York's foreign-trade zone. Here it is inspected, cleaned and graded, and prepared for auction and distribution throughout the world, with the finest imported into the U. S.

Otto was a sewing-machine maker. He lived in Germany before the war but

could stay no longer under Hitler. So he looked to America. But moving from city to city is hard—and much harder is moving to a strange city in a strange country.

How to start in business once again, what to do with equipment while he looked were only a few problems. The last problem, and hard one, Otto solved by packing his machinery in a van, shipping it to New York's zone, and there storing it until he found a new life and a new place for his old business.

These few examples, picked from hundreds, tell what the U. S. foreign-trade zones can do for you who look to America for new markets. Whether you deal with an American importer or do your own distribution in the U. S. or plan just to re-export your goods or are developing American markets, foreign-trade zones offer you the services to make your job easier.

Zones Old to Europeans

Europeans long have been familiar with what are called foreign-trade zones. Over 700 years ago, the first free port of Hamburg was established. Later the growth of the powerful Hanseatic League, whose merchants traded eastward to Russia and south to the Mediterranean, encouraged setting up more and more free ports.

In the late 1800's, many of these free ports lost their free-trade aspect. So in these cities, free zones were set up that were exempt from customs regulations. Today in Europe, there are no free ports, such as Hongkong which is a truly free port in that ships go and come at will and cargo moves freely through without payment of duties.

The foreign-trade zones in America are patterned after the free zones of Europe. They are fenced-off, policed areas, set aside by federal permission. Merchandise including dutiable goods may be landed there without customs interference. Such zones, as far as your exports are concerned, are a no-man's land that offers relief from the necessary though rigid customs regulations that slow down trade and make it often difficult and expensive.

Six foreign-trade zones now dot the U. S. New York has No. 1, established in 1937. New Orleans' zone was opened for business in May 1947. San Francisco's zone No. 3 opened in June 1948. Seattle and Los Angeles established their zones in September 1949.

Zone No. 6 at Airport

Foreign-Trade Zone No. 6 has now been authorized at San Antonio, Texas, and will open its doors about August of this year. It is the first inland zone, the first to be located at an airport to handle air cargo without the need of intermediate handling, and the first to be established and operated by a private company, the Scobey Fireproof Storage Co.

These zones have been set up for just one purpose—to stimulate international commerce. They can help you, as an exporter of goods to the U. S., to cut duties and customs red tape. And they can help save you time and, at the same time save money.

You can do all these things:

You can land and store dutiable or non-dutiable goods with no customs expense or formalities. You can "manipulate" your goods—repackage, assemble, grade, clean, mark, mix with other foreign or U. S. merchandise. You can often process goods into a class subject to a lower rate of duty. An example—separating stones from ring settings and reassembling after entry.

You can enter goods, after required manipulation, into customs area on compliance with customs regulations or you can re-export the goods. Merchandise can be in original package and amount, or it can be repackaged as desired. This can save you from advancing large sums for bonds and duty payment. And you can save too by shipping in bulk and then

How Belgium Uses a Foreign-Trade Zone

Belgium has forged ahead of most European countries in finding American markets for its products. Much of the success, according to Belgian Consul-General Charles Leonard in New Orleans, grows from the use of the foreign-trade zone coordinated with an over-all import program.

- ***Current marketing trends in Mid-Continent U. S. are studied by trained trade analysts.***
- ***Three-thousand sq. ft. exhibit at the International Trade Mart shows the products of over 100 manufacturers.***
- ***Temporary sample rooms in cities up and down the Mississippi, numerous interviews with individual merchants, and constant observation of consumer demands help to judge the market's pulse.***

All these combine with trade-zone services to supply the American market. Stockpiling in the zone then overcomes, quickly and cheaply, one of the biggest obstacles to foreign import operations—the inability to make prompt delivery of goods in immediate demand. Shipments do not have to be timed exactly to meet the seasonal trade pattern in the U. S.

packaging into smaller parcels in the zone.

You can cut duty costs by marking in the zone any merchandise not properly marked before shipment. Otherwise you pay the regular duty plus a 10% ad valorem penalty for improper marking.

You can cut duty costs by sorting out merchandise that fails to meet U. S. market standards and either destroy it or re-export it to other countries where requirements are lower.

You can cut duty costs by not paying on "shrinkage." That's the part of stored merchandise lost through evaporation or seepage. Liquor, tobacco, nuts, and similar commodities lose weight this way.

You can cut insurance costs. When goods enter through customs and then are stored, insurance is carried on duty-paid value. Storing them in a foreign-trade zone lets you insure them for actual goods value. The difference can be big on items like liquor that carry high duties and excise taxes.

You can cut handling and office expenses and have your buyers examine and sample your merchandise stored in the zone. You may not exhibit or manufacture at present, but a bill that probably will be approved this year will allow foreign-trade zones to be turned into show places like the New Orleans International Trade Mart. Both exhibition and manufacturing will be allowed, and you can then advertise for buyers and, in effect, set up a wholesale shop.

You can store goods with no time limit —remember no duties or excise taxes have to be paid as long as the goods are in the zone. That saves you the interest on duties. It is a cheap, quick way to insure adequate inventories for the U. S. market. You can also borrow against warehouse receipts issued for goods stored in a zone without posting a bond.

You can ship and store goods that are under "quota" restrictions. Quantities in excess of quota can then be held awaiting the next quota period.

You can trans-ship original or processed goods without penalty of customs duty and are free from drawback headaches. Those headaches come from wait-

How Goods Are Processed in Foreign-Trade Zones

Here are only a few of the many ways goods are being processed in U. S. foreign-trade zones before their entry through customs or before they are re-exported:

- ***sift and clean flour and vegetable seeds.***
- ***vacuum fumigate cotton, straw, bulbs, seeds, tobacco.***
- ***bottle liquor, wines, perfumes.***
- ***blend liquor and wines.***
- ***add adulterants to products to change grade.***
- ***replenish brine and other preservatives.***
- ***assemble products shipped knocked-down.***
- ***cure unshelled nuts and resalt, grade, and blanch shelled nuts.***
- ***examine, segregate, repack, camphorize, and auction household effects.***
- ***sample, recondition, sort, grade, and repack tobacco.***
- ***sample and repack ores.***
- ***repack and mark country of origin on silverware.***
- ***examine, repack, and cut sample lengths of fabrics and yarns.***

ing to collect the 99% refund supposed to be paid by the U. S. Treasury Dept. when a previously dutiable article is exported as a part of processed goods.

You can move goods in and out of a zone with little restriction. Regularly imported goods on which duty has been paid can be moved from a customs area into a zone, combined with other items, and returned to customs free of duty.

You can move U. S. goods into a zone under customs supervision and return it freely to customs territory.

You can hold auctions of your goods in a foreign-trade zone.

You can protect yourself when exporting food to the U. S. by sending it through a foreign-trade zone. There it may be examined, inspected, conditioned. Small lots may be entered and passed on separately by the U. S. Food and Drug Administration. Having large lots sampled and examined, as in normal import procedure, may mean rejection of the whole amount.

You can land goods at any port and have it transferred to a zone under bond. But the merchandise is subject to inspection and possible refusal by customs to grant entry.

You can change your mind and save the duty. If you bring goods into a zone and the American market slumps, as it did sometime ago in foreign automobiles, you can divert the shipment to other markets.

You can move your own machinery, equipment, and supplies to a zone for manipulation purposes. When finished, you can then re-export them or import them on payment of duty. Or, of course, you can use zone facilities or have U. S. equipment brought into the zone.

What Will This All Cost?

You can do all these things—*but what will it cost you?* Your costs for storing and for handling are largely based on size and weight of merchandise. Manipulation or special services are charged on the basis of man-hour cost, while processing space is usually leased on a square-foot rate.

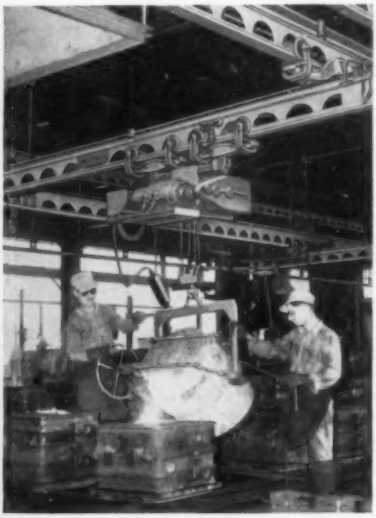
As zones are operated in the U. S. as public utilities, all rates and charges are reasonable. Here is a typical example: 8¾¢ to move 100 lb. from ship's tackle through the zone, 5¾¢ to store it for the first month, and 3¾¢ for each additional month.

If you want more information on any one or all of the U. S. foreign-trade zones, if you want to know exactly how you in your business and with your product can benefit from their services and advantages, write me and I'll be glad to see you get the information.—The Editor

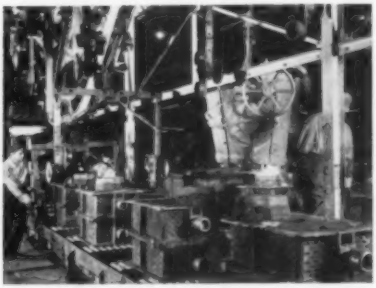
How To Handle Molten Metal

OVERHEAD MONORAIL has switches and spur rails to carry ladles from cupola to molding floors. Distributing ladle being filled is typical covered unit.

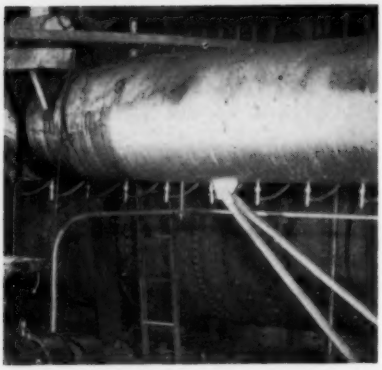
AUTOMATIC device places weights on molds. As conveyor brings molds to pouring station, monorail makes downward jog, dropping weights on them.



TRAMRAIL SYSTEM, similar to other overhead system but powered, carries ladles to pouring stations. This ladle on bridge over mold floor pours 139 molds and 11,000 lb. of metal per day.



DIFFERENT CONVEYORS combine in integrated pouring area. Molds run on gravity and powered roll conveyors. Overhead conveyor picks up molds, carries them to shakeout.—Foundry, Feb, p78



ROTARY COOKERS *prepare fish waste for pressing with 20-min. steam cook*

CENTRIFUGES *separate oil from press liquor (background) and stickwater (foreground)*

Fish Waste to Cash Profit

Instead of dumping its fish waste into the harbor, a Maine company condenses it to rich animal-feed byproduct—and makes money doing it

CONCENTRATED FISH SOLUBLES are produced at the new byproducts recovery plant of Associated Fish Product Co. in Maine. Special equipment condenses fish-waste stickwater; the resulting solubles are used to enrich poultry and livestock feed.

The units handle 15 tons of fish waste per hour. They recover, in addition to fish oil and meal, from 2,250 to 2,625 lb. of fish solubles. This nets up to $210 on the 15 tons of waste.

The fish waste is trucked from nearby sardine canneries, dumped into outdoor hoppers, and carried by screw, belt, and drag conveyors to a continuous rotary steam cooker. Here the waste is given a 20-min. live-steam cook, then fed to continuous screw presses.

Press yield is 40% cake and 60% liquor. Press cake is dried to a moisture content of 8% in a continuous direct-fired rotary dryer. It goes next to a Reitz disintegrator, which mills it so particles will pass through a 100-mesh screen. The ground fish meal is cooled and bagged.

Clarification of press liquor is the next step. It is pumped from screw presses to centrifuges (Sharples Super-D-Canters), which separate some suspended solids from the liquor. These solids are added to the press cake entering the dryer.

The clarified liquor is pumped to the stickwater plant. It is heated to 200° F. in a heat exchanger to break down the oil-and-water emulsion for greater oil recovery.

The liquor is centrifuged to separate oil. The remaining liquor, now called stickwater, is pumped to an acidulation tank in which it is mixed with 66° Bé sulphuric acid to lower pH from 6.5-7.0 to about 4.5. The acidulated stickwater is held in the tank for ½ hr. to coagulate the suspended solids.

The stickwater is centrifuged to re-

move final traces of coagulated solids. These solids are a highly saleable product, being extremely rich in riboflavin.

The clarified, acidulated stickwater is again heated to 200° F. in a heat exchanger and recentrifuged to recover 5-10 gal. of oil per hr. Now, with suspended solids and most of the oil removed, the stickwater is evaporated to concentrate the soluble solids. This is done in double-effect evaporators at 1,500-1,800 gal. per hr., condensing stickwater from 7% to 50% soluble solids.

Condensed fish solubles are pumped to an outside storage tank. Before shipping, solubles are circulated with a steam pump, then pumped to tank trucks.—Food Ind, Feb, p54 and 96

New Ideas in Product Design

Every day sees new ideas in design of products. Here are a few:

Air waves slice metal into transparent shavings 0.000002 in. thick. The stock is held in a chuck that positions it close to the blade of a microtome. As blade rotates at 65,000 rpm., shock waves generated at tip shave sections from the material in thicknesses determined by spacing between blade and stock.

Absolute values for hardness of materials are claimed for a new scale. An equation involving the cube root of Vickers penetrator micro-hardness gives nearly linear relationship of values from talc to diamonds.

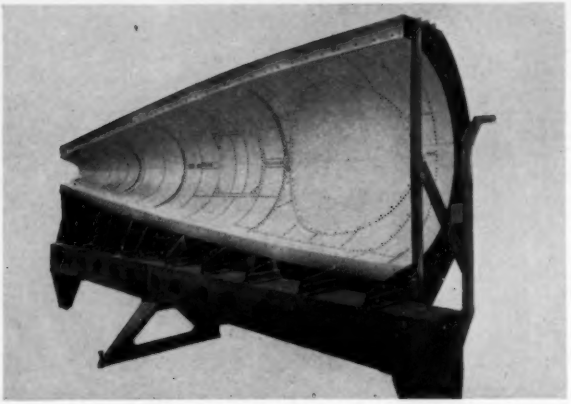
Starting switch for manual control of electric motors from 1/12 to ½ hp. protects unit from overheating during stall or overload. Thermal disk prevents restarting until overload is cleared and motor has cooled.—Prod Eng, Feb, p5

Borate Ore Controls Weeds

To control weed growth around wooden railroad trestles, Missouri Pacific Lines has turned to borate ore. The concentrated ore is applied to surrounding area by hand. Borate treatment is $1.66 per linear foot per year cheaper than previously-used shovel cutting and hand scalping.—Railway Engrg & Maint, Jan, p54

SILICONE SURFACE COATINGS SUPERIOR

Silicone resins modified with organic groups have superior coating properties and resistance to heat, moisture, and electrical forces. They look the same as paints made from conventional vehicles and can be applied by usual methods. Heat resistance is shown by steel test panels above. Panels 1 and 3 have silicone aluminum finishes, 2 & 4 oleoresinous finishes. Panels 1 & 2 were subjected to burner temperatures for 15 min., 3 and 4 for 2 hr. The appearance tells the story.—Prod Eng, Feb, p109



ENVELOPE JIGGING

Fairey Aviation Co., Ltd., England, has reversed aircraft subassembly methods and starts construction by first mounting the shaped outside skin in the fixture. To the skin are affixed the ribs and other internal members. Called "envelope jigging," the new method will be used in building the Fairey 17 prototype. With the method, prototype bscomes the first production model. —Aviation Wk, Jan 30, p27

Metallized Picture-Tube Manufacturing Methods

Production of aluminum-backed screens on television picture tubes requires two more basic steps than in normal manufacture of tubes. They are: (1) formation of basic carrier on which metal is evaporated on the phosphor screen surface and (2) evaporation of metal on the carrier.

A screen is deposited on the interior of a picture tube by settling phosphor from suspensions, spraying from suspensions, dusting onto binders, or centrifugal means. The screen is then dried, and the carrier applied.

The carrier, a nitrocellulose powder dissolved in an acetate solvent, is placed as a membrane across the phosphor. One technique is to put water over the screen, add carrier solution which spreads over the water surface, and pour the water out from under the carrier membrane. The membrance then hardens.

The tube is now ready to receive the evaporated metal, which serves as a light reflector from the interior screen side. The tube is connected to a vacuum system. Aluminum is heated, evaporated, and fed into the tube. The membrane is removed by baking.—Electronics, Feb, p76

Renew RR Gondola Cars

Railroad gondola cars are renovated at shops of the Union Pacific RR on an assembly-line basis—6 cars a day. Renovation adds 10 yr. to car's life.

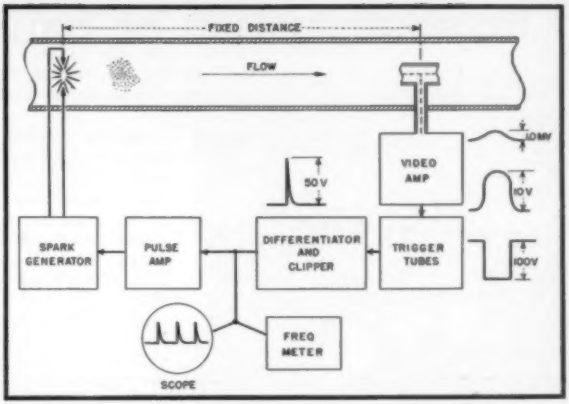
Before car enters line, weldors strip car down to trucks, center sills, crossmembers, and ends with acetylene torches. On track in shop, car gets a pair of ½-in. steel center floor plates, then side slope sheets. On return trip, on adjacent track, drop doors, sill steps, and ladders are added.—Business Wk, Feb 4, p54

When To Buy a New Machine

A new method of computing potential return on capital invested in new machine tools has been devised by the National Machine Tool Builder's Association. The method actually takes into account two points of view—shop management and production management. By

MEASURES SPEED OF GAS FLOW

High gas speeds can be measured without shock waves as caused by orifice plates or pitot tubes. This device produces ions in gas by spark gap and times their travel to ion collector 1 ft. down-stream. Feedback connections between amplifier and generator provide recycling system of which repetition frequency is function of gas speed. Range is from 20 mph. to supersonic speeds. — Electronics, Feb, p80



using a special work sheet, the user can see in detail the effect of new machine tools on his operations—and know how much the new machine will save him.—Am Mach, Feb 6, p71 and 117

How to Design Products for Resistance Welding

Design for resistance welding should represent the coordinated efforts of engineering, tooling, production and sales departments. When the actual formation of design ideas is underway, these suggestions will help:

1. Calculate the length of the production run.
2. Use special alloys only where necessary and specify materials of best possible weldability.
3. Keep the welding technique in mind—not merely the welding.
4. Get a mental picture of the equipment needed.
5. Incorporate processes in the design that will provide good fit of parts.
6. Use as few welds and parts as possible to build up the structure.
7. Reduce handling.
8. Reduce or eliminate machining wherever possible.
9. Consider possibility of attaching small, easily machined parts to larger assemblies by welding.
10. Study joint design from both stress and tooling viewpoints and determine proper equipment needed.—Weld Eng, Jan, p34

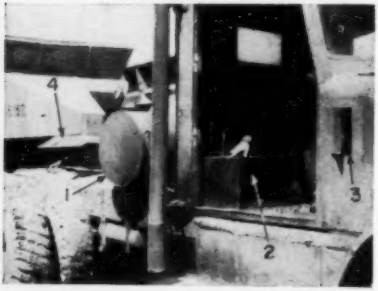
Ducted-Rocket Research

The ducted rocket appears to provide the high-speed performance of a ramjet engine and also efficient operation at low speeds. Research on ducted rockets—essentially a rocket motor installed in the duct of a ramjet engine—is being carried on by the U. S. Navy. Theoretical advantages are the takeoff boost of a rocket combined with the ramjet characteristics of sustained flight.

The rocket motor, producing 50 lb. of thrust, uses liquid oxygen as its oxidizing agent and ethyl alcohol, gasoline, or diesel oil as fuels. Efficiency of the engine is increased by using high-velocity rocket gases to raise temperature of ram air and increase thrust.—Aviation Wk, Feb 6, p14

Clever Adaption of Equipment

Contractor develops novel method of mixing clay to specifications in gut. Adaptions to standard equipment raises their operating efficiencies



HARLAND COUNTY DAM calls for 10,200,000 cu. yd. of borrow. It is taken from shallow pits upstream from the dam axis. But to keep clay content to specification of 25% maximum clay content, Harlan Construction Co. has developed a clever borrowing technique. Under topsoil lies 5 ft. of material running as high as 40% clay content. Material below this strata runs lower in clay content.

Engineers recover the proper clay-content mixture by mixing high- and low-content clays while scraping the sides of the pit.

After topsoil is removed, a 12-ft. deep narrow gut is cut in the center of the area wide enough to take a Euclid loader. Loader shaves off the gut in a circular pattern, digging little material off the floor.

Vertical wing that scrapes the gut face, designed by the contractor, resembles a patrol grader blade. Hinged to the left front corner of the loader, it is heavily braced to frame and is adjusted vertically by hydraulic ram. Each pass cuts 4 to 6 in. from gut face. Material falls in front of the plow and is picked up by belt and loaded into wagons.

Pictures at left show minor modifications made by the contractor to standard equipment to raise its efficiency:

1. Two small, side-mounted gasoline tanks were replaced by a 95-gal. tank. Feed is better because tank is higher; filling is easier.

2. Battery was shifted from running board to cab floor to simplify checking and reduce breakage.

3. Vents cut in cab increase operator comfort.

4. Metal skirt over ball-socket hitch deflects spilled dirt.

5. Welded support brackets hold drop-

in unit to differential banjo housing with four ¾-in. bolts front and rear; brackets eliminated stripped studs and lost grease.

6. Rear traverse spreader was braced by ¾ x 4-in. strap to hold wheels to correct camber.

7. Rear frame was sealed to serve as 5-gal. oil reservoir for oiling walking-beam bushing.—Cons Meth & Equip, Feb, p40

Dynel—New Synthetic Fiber

A new staple fiber—acrylonitrile-vinyl chloride—has been developed by Carbide & Carbon Chemicals Corp. Called Dynel, the fiber is said to have high resilience, "loft", warmth, strength, fire resistance, moth proofness, and fungus inertness. It has dimensional stability, dries rapidly.

Dynel can be dyed readily on conventional machinery and handled easily on cotton, wool, worsted and spun silk systems. Bright colors with good fastness to light, washing, and crocking have been attained with a large number of acid dyestuffs. Acetate colors are satisfactory.

High resilience of Dynel fibers contributes unusual and permanent "loft" of fabrics. The staple launders and drycleans without shrinkage. Fabrics should not be hot-ironed.—Chem Eng, Dec, p154

Train Pilots at 5¢ per Hr.

An electronic ground trainer for jet plane pilots, developed by Link Aviation, Inc., trains pilots for 5¢ per hr. The C-11 trainer runs an hour for 6-7 kva. of 220-volt current. The company believes the trainer would cut in half the number of hours required for annual flight checks.—Aviation Wk, Jan 23, p32

Coming in May . . .

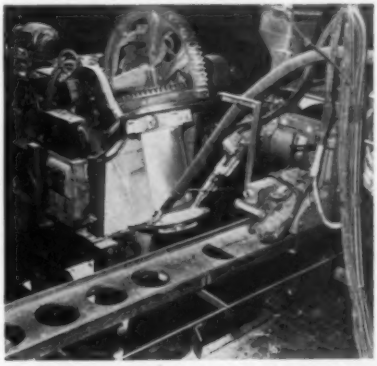
. . . is an article directed to the engineers and management of every plant that must handle material in bulk or package. It will tell you how to tool up industrial trucks to speed up those tricky handling jobs.

Elevator Doubles Output

Elevator lowers . . .

. . . welding positioner below floor level to weld the gland ring to top of a pump liner shell at Gardner-Denver Co.'s Quincy plant. The device is air operated. Then the . . .

. . . Elevator raises . . .



. . . the positioner and gland ring to make the bottom weld. Each weld is 28 in. long and is made in 2½ min. Production is double the former output by hand welding. The new setup and submerged-arc welding has boosted production rate to four units per hr.—Weld Eng, Feb, p32

Packer Controls Ham Cooking by Electronic Indicator

Preparing boiled hams at Esskay's Baltimore meat-packing plant is a high-production job. Hams are fed by stainless-steel slat conveyor through an automatic washing unit, past the boning stations, and then to packing.

Hams are packed into four different types of packs: (1) pear-shaped tins, vacuum-sealed, and cooked; (2) forced into parchment paper-lined rectangular cans by hydraulic press, vacuum-sealed, and cooked; (3) and (4) packaged, after pressing and cooking, in parchment paper-lined ham molds, one being wrapped in cellophane and the other stuffed into a cellophane casing.

Ham boiling is controlled by an electronic indicator. A control ham is pressed into a special mold that has a hole in one end. A thermocouple is pushed through the hole and into the ham, thereby giving its internal temperature.

When the temperature reaches 152° F., it is held for 3 hr. Cooking-water temperature also is controlled. With close regulation of both temperatures, hams are neither overcooked nor undercooked. —Food Ind, Feb, p78

TWIST DISPENSER

This plastic model shows the principle of a new package combining the features of a collapsible tube and a dispensing jar. Package looks like a metal-and-fiber canister 1½ in. in dia. Actually it is a polyethylene bag within a cylinder. Cylinder wall is spirally wound. Torque motion at base forces out contents. Manufacturer, General Cap & Container Corp., claims 99% extrusion as compared to 85-95% for collapsible tubes.—Mod Packaging, Feb, p86

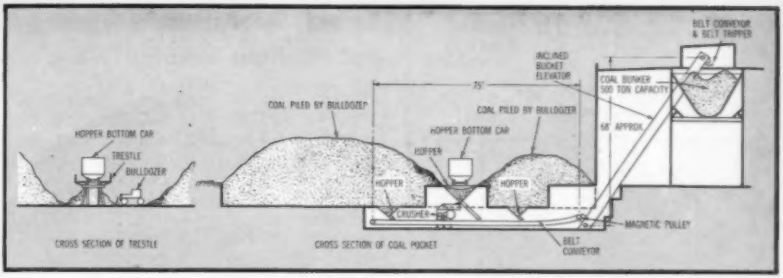
Tests Residential Heat Pump

Trial home installation of a heat pump has given Utah Power & Light Co. first-hand experience. Test conclusions were:

- A better bond between earth and piping can be obtained by horizontal rather than vertical piping installation.
- Vertical piping, when used, should be tested with city water pressure before it is placed in operation.
- Supply piping might be installed under the basement floor to reduce noise and vibration.
- Automatic control to change from heating cycle to cooling cycle is desirable.
- Noise elimination is a major problem of equipment manufacturers.—Elec West, Jan, p69

Removes Paint from Cars

Time and mess of removing paint from cars prior to repainting is eliminated with a new process developed by Helper Paint Removing Service, Inc. Two tar chemicals are sprayed or brushed on surface and allowed to set for several hours. Water stream removes tars and old paint together. New paint can be applied at once. Process costs about $20 per car. —Business Wk, Jan 28, p52



HOPPER SYSTEM SAVES 37¢ PER TON OF COAL

This coal-handling system at Norton Co. saves 37¢ per ton of coal used—a total of $11,000 per year. Hopper-bottom cars pull directly onto trestle and discharge. Bulldozers pile coal. Hopper under trestle delivers directly to powerhouse bunker. If bunker is empty and no train is scheduled, two other hoppers feed to belt conveyors. Inclined bucket conveyor raises coal to bunker. Coal storage area, adjacent to powerhouse, is 426x136 ft. Additional benefits from yard: reclaimed former storage area, fewer coal fires and stratification, less contamination from foreign matter.—Factory, Feb, p74

Sliding-Form Construction Used for 8 TV Relay Stations

Eight television relay buildings from 80–127 ft. high were built with slipform construction techniques by Rust Engineering Co. Buildings are 4–5 stories tall, measuring 24x24 ft. outside-to-outside. Walls are 12 in. thick. Buildings will support horn-shaped antennae to receive, amplify, and retransmit the television signal.

The sliding-form construction eliminated need for scaffolding and fixed forms. Following completion of foundation, a 150-ft. timber-frame men-and-materials tower was erected. At the same time, sliding forms were assembled on foundation. Forms were 4 ft. high, of tongue-and-groove lumber, yokes extending upsides and across above them. Top cross-piece of each of the 26 yokes served as jacking member. Twenty-six 1-in. dia. rods in center of walls support an equal number of screw jacks.

Force of hand-operated screw jacks was taken against a collar clamped around the rods by set screws. When threads were runout, they were released and retracted. Collars then were loosened, moved up, retightened ready for another jacking.—Cons Meth & Equip, Feb, p68

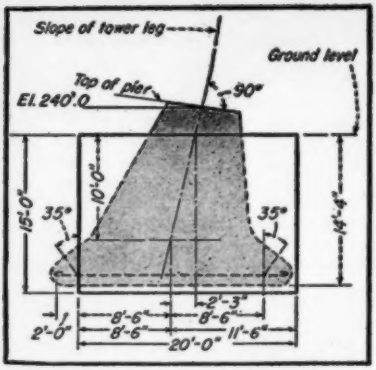
Solves Gold Recovery Problem

Coarse gold shows up frequently in the ore being milled by Resurrection Mining Co., which treats a heavy sulphide gold-silver-lead-zinc-iron mixture by flotation. The process has been in operation for 3 yr.

To get clean amalgamation from the concentrate without fluored mercury, the company uses the following mixture in a 30-in. Berdan pan:

Sulphide concentrate	50 lb.
Sodium hydroxide	0.75 lb.
Sodium cyanide	0.50 lb.
Lead acetate	0.50 lb.
Quicksilver	10 lb.
Hot water	2 gal.

The mixture is mixed for 2 hrs. before amalgamation is complete. This results in recovery of over 98% of the gold content.—Eng & Min J, Jan, p71



CARRY 760-FT. TV TOWER

These footings will carry WOR's 760-ft. television tower, the tallest self-supported steel tower in the U. S. Poor rock dictated rectangular gravity-type footings. Dotted lines indicate keying into rock; solid lines show gravity blocks for two of the four footings. Footings are at corners of a 96-ft. square.—Eng News-Rec, Feb 2, p43

Paper Bleaching pH

Automatic control of pH in paper bleach plant operations has been achieved by Northwest Paper Co. There are two stages of chlorination with lime neutralization in the second stage.

Bechman electrodes are set in an 8-in. dia. pipe line that handles 3½% consistency stock at 475 gpm. and 3 fps. A Saunders valve in the line assures free flow without danger of plugging from the milk-of-lime slurries.

Pressure in the lime line must be kept higher than that in the stock line. Reducing lime pressure to just above stock pressure allows much better control.

Electrodes do not scale up. Pulp at 3½% consistency flows past the electrodes without packing around them. Accurate measurements of pH can be made over 6–12 range. Measurements are recorded on a circular-type chart.—Paper Ind, Jan, p1200

Selects Transfer Machines for Medium-Volume Work

Required output, costs, and plant layout must be considered in selecting transfer machines. For medium-volume production, the possibility of tieing up the whole plant in case of breakdown generally rules out the use of a single machine. Besides, labor savings with only one transfer machine are minor compared with those with several transfer machines.

To secure balanced production at low costs, Cadillac Div. of General Motors Corp. follows this selection policy:

1. Group operations according to (a) type and speed and (b) accessibility of work faces to tools without turning work sideways or flopping it over while in the machine.

2. Choose machine according to this analysis and with proper regard to efficiency of work location, work clamping, and tool-head location.

3. Specify replaceable carbide drill bushings to cut maintenance costs.

4. Leave room ahead of each machine for parts bank to keep the unit running if another transfer machine is idle for tool replacement or repair.—Am Mach, Feb 6, p84

Deep-Water Drilling

Drilling for oil in 350 ft. of water is claimed to be possible. Even now, equipment is being planned for the job.

Plans call for a submersible, recoverable barge supporting the drilling platform. Masts 425 ft. high will stand at the corners of a triangular barge, 90 ft. on a side. The drilling platform, also triangular, will be supported from the masts.

Once the barge is in drilling position, its compartments will be flooded to sink it to the bottom. The platform will then be positioned along the masts above wave action.—Oil & Gas J, Jan 26, p161

World Textile Output Picture

Yarn and fabric production is now on the increase in overseas producing countries. Devaluation, government controls curtails production in some areas

MARSHALL PLAN aid to Europe was reflected in the revival of the textile industry around the world in 1949. Reports from McGraw-Hill World News correspondents indicate that yarn and fabric production over-all is up.

New synthetic-fiber-producing plants were started or planned in many countries to reduce dependency upon dollar- and sterling-synthetics.

The picture in the major producing countries is as follows:

Australia—Mills overcame the handicaps imposed in 1948 by the 40-hr. week legislation through incentives, shift work, and technical improvement. British competition was felt. The industry has begun to ask for tariff protection, especially in the synthetic field. Capacity was increased in carpet-yarn spinning, carpet weaving, and nylon-hosiery knitting.

Brazil—Foreign markets nearly disappeared during the year and manufacturers fought to hold local markets. Textile exports of $85-million in 1945 dropped to $4-million in the first half of 1949. High prices, poor quality, and the government's ban on exports in 1946 hurt the industry. The U. S., Great Britain, and Japan took over much of Brazil's markets.

Canada—Change in tariffs, import quotas, and exchange rates presented new market situations during the year. But they did not alter the production picture. They did cloud the outlook for 1950. In June, to boost British imports, all duties were dropped for a time. But jobbers and exporters merely raised their prices equal to duty reduction.

British pound devaluation caused alarm but was not followed by stiffened British competition.

Egypt—Production of cotton yarn and cloth exceeded consumption by 35-million lb. Import duties were raised and premiums for export were granted. Cotton-yarn imports will practically cease and imports of cloth will be reduced. Only 110,000 lb. of cotton cloth was exported during the year.

France—Wartime government controls were shed in 1949. All yarns except cotton and nylon went on free sale. All fabrics are now unrationed following recent freeing of industrial and technical fabrics. Controls were lifted from many

"HAND-PAINTED" BY ROLL

These "Master-Print" fabric designs, resembling hand-painted designs are produced by copper-roller printing in a recently developed process. Process permits great gradations of color. Designs eliminate necessity of register and permit use of solid-color backgrounds. All-over patterns can be produced with one or two rollers only—up to six can be used.—Textile World, Feb, p268

textile supplies. French-made machinery, too, went on free sale.

Textile price controls were dropped and the return to free trade caused a price dip early in the year. Marshall Plan dollars eased hard-currency shortage. The industry as a whole operated 20% below capacity for lack of raw materials—90% must be imported.

Great Britain—Compared to 1948, there was considerable increase made in fiber and woven fabric output. In export, achievements were remarkable in view of stiffened competition. Shortage of labor, high prices of raw materials, and insufficient machines hurt the industry.

India—Continuous and contradictory changes in production, distribution, and price controls cut India's 1949 output 400-million yd. Over a dozen Western India plants were closed or had cut output by year's end. Distribution machinery failed to move goods to market. Influx of sterling-area textiles in the first half of the year hurt the local industry.

Italy—No county exceeds Italy's textile production for export—25–33%. To maintain its international position, Italy's textile industry has re-equipped plants and modernized production. Synthetic-fiber manufacturers lead the industry. Raw-silk production was off 50% from 1948, because of increased Japanese silk and U. S. nylon.

Japan—Production was expanded 25% during 1949. Activity was still only 22½% of the 1932–36 level. Textiles still comprise the bulk of Japan's production and export. Textile exports reached $245-million during the year.

Emphasis in Japan is on synthetics—both polyvinyl and polamid types. Pilot-plants are operating but lack of capital prevents commercial production.

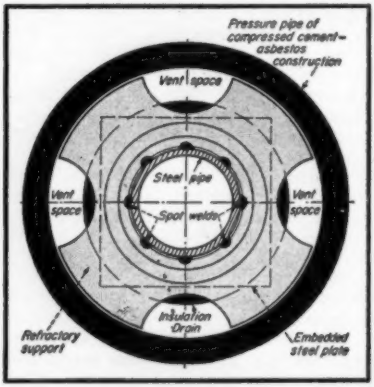
Mexico—To keep abreast of new textile developments, Mexico's industry had 10 new plants under construction at the close of 1949. Foreign markets must be regained if local plants are not to be forced to close down or curtail production.—Textile World, Feb, p117

Materials Handling Train Runs on Regular Schedule

Cadillac Motor Car Div., General Motors Corp., uses a trackless train system in its production areas for all materials handling. Each gasoline-powered "locomotive" hauls a 10-trailer train. Trains run regular routes on an on-the-hour schedule.

Each train is made up at a primary producing area—foundry, receiving, plating, pressroom. Stations are located in aisles in primary processing areas. Trailers are tagged to show destination. At each station trailers are dropped off and others picked up for delivery farther down the line. Two trucks are on standby for emergency deliveries.

Bulky items, such as automobile frame, sheet and bar steel, pig iron, etc., are not handled by the trains.—Factory, Feb, p88



WATERTIGHT, UNDERGROUND PIPE

This conduit system, developed by W. J. Whatley, supports steel pipe at regular intervals by high-tensile refractory with an embedded steel face designed to fit varying size pipe. Support is slipped into pipe, then spot-welded. System is uncased in a pressure pipe of compressed cement-asbestos.—Eng News-Rec, Feb 2, p108

Silicone Treatment Makes Nylon Water Repellent

Silicone DeCetex 104, developed by Dow Corning Corp., can be applied to nylon fabrics, mixtures containing high percentages of nylon or acetate rayon, or mixtures of acetate and viscose to make them water repellent. Silicone can be applied to loosely woven marquisette as well as tightly woven 8-oz. material.

The new material is a viscous, high-polymeric silicone containing 65% solids in a non-toxic, non-flammable solvent. It is colorless, odorless, and contains no corrosive chemicals.

It is applied to fabrics from a dilute oil-in-water emulsion with pad or quetsch. Fabric is then dried, drying being followed by high-temperature curing. After curing, each filament has a tightly bonded silicone surface durable in soap or dry-cleaning solvent.

Amount of silicone necessary to give satisfactory result will depend upon weave, weight of fabric, and fiber used.—Textile World, Feb, p155

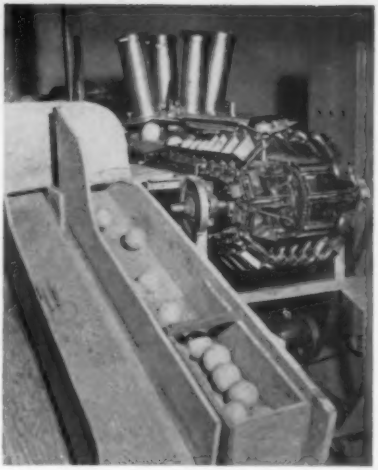
Cold Welding Finds Uses

Welding of nonferrous metals by pressure at room temperature—a development of General Electric Co., Ltd., England—utilizes three different techniques. These are the straight weld, ring weld, and continuous seam weld.

The straight weld can be used for box seams, sealing tube ends and other forms of lapped joints. It has been found superior for vacuum or moisture proofing.

The ring weld is suitable for sealing the end of a flanged tube, joining a flanged tube to a plate, or uniting disks to form an air-pressure cell.

The seam weld will find its major applications in tube making and cable-sheath fabrication. The free edges of a box-shaped section can be seamed by rolling.—Prod Eng, Dec, p149



X-RAYS SORT ORANGES

X-ray system checks internal condition of each orange and routes it to one of six classifications. It compares X-ray capacity of tested orange with that of a standard. Frost-bitten oranges, for instance, can be detected. Inspection rate is 10 per sec. Unit is made by Automatic X-ray Corp. of Los Angeles.—Electronics, Feb, p134

Renew Bridges By Precasting

Precasting technique will be used by Lowell, Mass., to recondition over 40 bridges. They range from 20–55 ft. in length. Many are wooden structures of limited capacity. Spans up to 20 ft. will have precast plank or channel-slab construction. Larger spans will have a variation of precast joint arrangement.

In the latter, the beam is to be precast and the deck slab cast in place. The entire design will act as a T-beam after deck has hardened. Deck slab will be supported by ledger strips along lower edge of precast beams. All spans will take H-20 loadings.—Eng News-Rec, Feb 2, p34

THIS RANGE of cartons can be formed by a new semi-automatic . . .

Adjustable Carton Machine

Circle F Mfg. Co. has put into operation its semi-automatic, adjustable cartoning machine. The machine handles cartons from 3¼ in. square by 8 in. long to as small as ¾x1½x2½ in. Changeover from one size to another is simple, no special tools and only a few spare parts being needed. Machine cost $6,000.

Cartons are hand filled. Machine speed is variable from 25-120 cartons per min. Speed is determined by rate at which two or three girls can load cartons. Cartons can be reverse tuck, straight, or airplane type. The cartons are automatically fed, formed, held open for load, closed, and discharged.—Mod Packaging, Feb, p80

Packaging Chemicals

Chemical users will benefit from new developments in packaging. One new item is a porous carbon disk incorporated in steel-drum plugs to provide a means of venting. Devised specifically for use in steel drums for export shipments of 66 deg. Be. sulphuric acid, they have possibilities in packaging liquids of high vapor pressure.

Steel-drum linings are being studied at Battelle Memorial Institute. It has been found that several new coatings—white polymerin, pure phenolic polyvinyl butyral compositions, vinyl chloride acetate and phenolic blends, and epon phenolics —are promising.

Butyl-lined rubber drums have been on test in hydrofluoric-acid service for less than a year. Longer tests are needed to prove the value of these containers. but results to date look good.—Chem Eng, Jan, p197

Unit Eases Quality Control

Mathematical computations are eliminated in quality control with a new electric computer developed by the General Electric Co. Photocells count the number of items produced and the number rejected. Meter shows reject percentage immediately, eliminating previous time lag between inspection and completing of mathematical computation.

Inspector punches button labeled for defect noted when he rejects an item. If reject percentage runs above normal, meter needle reads on a red scale. One installation has cut rejects 60%.—Business Wk, Feb 4, p58

New Uses for Fruits

Bread is looked to as a means of selling more fruit in California. Raisin bread, of course, is well known. But now sieved prunes, chopped dry figs, sieved cooked apples, and chopped dried apples are going into bread.

Other markets are breakfast cereals, cake, wafers, crackers. Fruit granules have been improved by combining fruit concentrates or finely ground dried fruits with 1½-3 parts of dextrose; extruded "dough" is dried, crushed, and screened, —Food Ind, Jan, pW3

Ion Exchange Removes Silica from Boiler Water

Modern high-pressure boilers demand water of reduced solids, controlled alkalinity, zero hardness, and low silica. Recent introduction of a strongly basic anion-exchange resin allows removal of silica by deionization.

The resin is Rohm & Haas Co.'s Amberlite IRA-400. It is capable of completely splitting neutral salts and exhibits unusual capacity for weakly acidic substances.

An investigation on its removal of silica presented these points:

1. Resin's capacity for silica is independent of influent silica concentration up to 500 parts per million SiO_2.
2. At flow rates of 5 gal. per cfm., no reduction in exchange capacity or increase in silica leakage are apparent.
3. Silica is probably removed as Si_2O_7.
4. Use of $NaHCO_3$, NH_4OH, and Na_2CO_3 are ineffective as compared to NaOH for resin's regeneration in silica-removal process.
5. Resin's exchange capacity depends on ratio of silica to total anion content of water treated.

Several installations have been made, others are underway. The result: equivalent of distilled water in ionic purity at low cost.—Power, Feb, p93

Faster Forging Normalizing

High-thermal-head normalizing is cutting heat-treating costs for Taylor-Wharton Iron & Steel Co. The job is to normalize forgings of heavy-wall seamless tubing for gas cylinders.

In conventional heating, rate of heat transfer is rapid initially but slows down as work temperature approaches furnace temperature. The new installation insures a fast rate of heat transfer over the entire heating cycle by using a higher furnace temperature.

The heating time is limited only by the ability of the work to absorb heat safely. The work must be removed from the furnace before it is overheated. The installation therefore provides for automatic temperature control and conveyorized handling of forgings.—Steel, Dec. 26, p53

34-Mi. Tunnel a Possibility

San Diego, Calif., has been dreaming of blasting a 34-mi. tunnel through the mountains that long have blockaded free traffic with states to the east. The dream has now reached the preliminary planning stage. Plans call for a 75-ft. wide 60-ft. high tunnel. It would accommodate a divided highway on the upper level and four railroad tracks on the lower level.—Business Wk, Feb 18, p81

"SCOTCHLITE" RR SIGNS

Effectiveness of "Scotchlite" reflective sheeting is shown by this stop sign and crossbuck in comparison with the white paint on the vertical support pole. The oncoming traffic lights provide the warning. The most common types of reflective sheeting are the wide angle type, which reflects light from any angle up to 85° to either side, and the smooth surface type, which reflects light received up to 30° from either side.—Railway Age, Feb 18, p42

MINING-AND-LOADING machines and larger dragline buckets paced . . .

Expanded Machine Use in Coal

Mining-and-loading machines, working room-and-pillar plans, extract 200-400 tons per shift, depending on seam thickness, with 4-man crews

PRODUCTION and preparation of coal saw many important developments during the past year in the United States. Underground, mining-and-loading machines and roof bolting were most important. In stripping, larger capacity buckets and growing use of augers raised recovery. In preparation, emphasis was on higher quality and increased quantity through mechanical and special equipment.

The last year proved mining-and-loading machines could average 200–400 tons per shift with crews of 4–6 men. Tonnage is controlled by seam thickness. The low-type continuous miner (see McG-H Digest, Feb, p47) is in operation in Oklahoma fields.

Mining-loading units in the U. S. are being used in room-and-pillar plans. Interest has been shown in the possibility of semi-longwall plans. A Canadian unit has been designed for this mining plan.

Mining without shooting was practiced widely. This involves cutting face up by a number of horizontal and shearing cuts and then bringing in a loading machine to load out coal. High efficiencies have been reported.

Big augers, modified from strip augers (see McG-H Digest, Feb '49, p17), may prove successful in underground operations. Belt slopes are the most popular type of opening where it is necessary to go down for coal. One 42-in. belt has a maximum lift of 862 ft. with a conveyor length, pulley centers, of 3,130 ft.

The number of all-conveyor mines with drift openings rose substantially in the year as did the use of horizontal belts supplementing truck haulage. A 30-in. steel-cord belt, 10,900-ft. long, was installed during the year. Progress was made toward development of a stainless-steel belt for both underground and surface use.

Roof bolting spread, with evidence that it will provide better roof support at lower cost than timbering. Roof-bolting developments included use of expansion shells for anchoring bolts, increased use of small bolts, and experiments with wooden bolts. Plans are to employ flex-

ible-type bolts where it is necessary to go farther into the top to anchor structurally weak strata over coal.

In stripping, the number of walking draglines and other high capacity shovel dippers paced development. Shovel dippers of 45- and 49-cu. yd. capacities were placed in operation in Ohio. A new 35-cu. yd. dragline bucket is of high-strength alloy steel weighing no more than previous 30-yd. buckets.—Coal Age, Feb, p76

Heat Panel Stabilizes Nylon

Heat panels of Fiberglas and wire produce heat for stabilizing nylon in Sill Industries' unique process which eliminates half the steps now used in stabilizing. Number of panels used depends upon speed required—four units on average fabric yield 25 yd. per min.

Currently installations are handling tricot material. Shrinkage is eliminated; there is no curl. Hand remains good. Temperature range of panels is 120–700° F.—Textile World, Feb, p172

Speeds Manhole Cleaning

Every year Consolidated Edison Co. of New York, Inc., removes 10,000 tons of muck and dirt from 190,000 manholes and service boxes. Scooping out was too slow. A new method saves 75% time and needs only a two-man crew. Water under high pressure is hosed into manhole. Dirt turns to sludge, which is pumped out to tank truck. Water is reused.—Elec World, Feb 13, p100

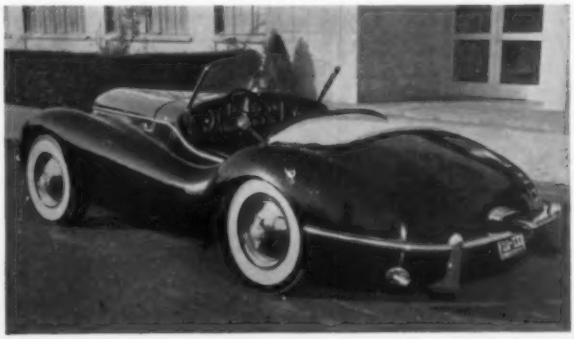
Deluxe Television Receiver

Two of the most perfect television receivers in the world provide for the British Broadcasting Corp. the best possible picture for monitoring purposes. The 20-in. tubes give a 16x12-in. picture.

Each unit has three times as many tubes as an ordinary domestic receiver. It reproduces picture and sound from a combined picture plus sync signal and an audio signal supplied it by cable. The receivers were built by Cinema-Television, Ltd.—Electronics, Feb, p152

Disposable Pallet Costs 20¢

National Sugar Refining Co. has patented a corrugated sheet-board disposable pallet costing only 20¢. Layer of packages is stacked and glued to a sheet of corrugated board. Sides are bent at right angles and glued to sides of stack. Board is again bent at right angle forming a wing on each side of stack. Forks slide under wings to lift pallet load.—Factory, Feb, p76



MEXICO'S FIRST

This flashy two-seater, powered by a Mercury engine, is the first automobile commercially produced in Mexico. DM Nacional is the maker. The company also is setting up a line for small five-passenger sedans to be ready for market in June.—Am Mach, Feb 6, p117

Plain Water or Brine Washes Picked Cucumbers

Germicidal agents are not needed for washing freshly-picked cucumbers. This conclusion was drawn from studies at Michigan Agricultural Experiment Station.

Agents, such as quaternary ammonium compounds, effect no greater reduction in the total micro-organism plate count than do 30 deg.-salometer brine or plain water.

After cucumbers were washed in brine, total bacteria count was reduced by about 50%. There was a considerable reduction in the coliform count, but practically no change in the total number of acid formers and yeasts.

When the quaternary ammonia compounds were added to the brine, there was no significant change in the microbial count or in the yeast count. On fresh pasteurized dill pickles, results were similar.—Food Ind, Feb, p68

Rivets Aluminum Alloys

Stainless-steel rivets improve joint strengths in aluminum-alloy structures. That is the conclusion of tests conducted at Consolidated-Vultee Aircraft Corp. The following recommendations also resulted from the tests.

Rivet wire should be bought in the annealed condition, headed, sandblasted, pickled, and cadmium plated. Rivets should be upset to a flat head of diameter $1\frac{1}{8}$ times the shank diameter. Extended-shank length for upset should be $1\frac{1}{4}$-$1\frac{1}{8}$ times the shank diameter.

Ultimate design shear strength of a protruding head rivet is at least 75,000 psi. Minimum spacing should be 3 diameters, and minimum edge distance 2 diameters. Stainless-steel rivets should not be employed with brittle materials, such as cast 195-T6 alluminum alloy.—Prod Eng, Feb, p112

Diesels Save Stored Water

Diesel engines can earn their keep in country that uses mostly hydro power. In Maine, two power companies save stored water and are certain of dependable power supply in times of water shortage.

Engines installed are 1,000-kw. units. When hydro power is readily available, the engines are held in standby. High fuel costs and transportation charges give an economic advantage to hydro units.

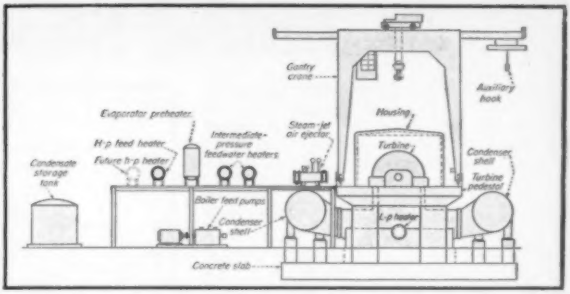
But hydro power depends on weather, so peak water supply does not necessarily match peak load demand. The diesels can then be pressed into service to handle demands beyond capacity of the hydro system.—Power, Feb, p102

SIMPLE SETUP FOR HIDDEN-ARC

Manual hidden-arc welding gun is mounted on carriage of cutting machine to make simplified automatic setup. Operation at Bethlehem Foundry & Machine Co. is straight butt welding of two ½-in. plates. No edge preparation is needed. —Weld Eng, Feb, p34

OUTDOOR PLANT

Minimum housing is featured at Louisiana Power & Light Co.'s new Ninemile Point Station on the Mississippi. Under design by Ebasco Services, Inc., station will have only central control room, battery room, and switchgear room enclosed. Firing aisle will have canopy. Steel turbine housing will have roof hatches.—Power, Feb, p118



Prefabricated Plywood Forms Speed Erection, Stripping

Preassembled forms, with reinforcing steel attached, speeded erection and stripping at New York's Union Bus Terminal. Forms, 28 ft. high and 24 ft. long, were assembled from ¾-in. plywood and 2x4-in. framing.

With forms on ground, U-shaped hangers were bolted at 2-ft. intervals and 2-in. concrete cubes were placed on the oiled face to hold reinforcing steel. Interior-face reinforcing was tied to hangers, then welded into rigid mat. Exterior-face reinforcing was welded and hung from top of form.

Crane moved the 14,600-lb. forms into place by a sling attached to welded plates at top of steel-channel strongbacks. Attachment point was over the center of gravity with steel in place. When stripped, forms were easy to lift because center of gravity of forms without steel shifted back of the support points.—Eng News-Rec, Feb 2, p44

Improves Blast Cleaning

Cast steel shot, recently developed by Steel Shot Producers, Inc., promises better blast cleaning and shot peening.

The new shot causes less wear on equipment, lasts longer, and eliminates some pickling. Field tests have shown that steel shot itself causes little equipment wear. But where heavy sand loads are circulated with the shot, there is little or no improvement in wear life.

Shot consumption with steel shot has been improved. In a Tumblast machine cleaning alloy steel forgings after annealing, steel shot lasted 5–6 times as long as chilled iron shot.

Part finish is better. Steel shot imparts a dull lustre and almost a polished appearance to the surface. In cleaning hot-rolled strip prior to cold rolling and tin plating, use of steel shot made it possible to eliminate the pickle rinse.—Iron Age, Feb 2, p82

High-Heat Electronic Torch

Hot enough to cut holes in firebrick or to melt tungsten, a new torch utilizes the action of 1,000-mc. radio waves on gases. It was developed at General Electric Research Laboratory.

An antenna made of two short cylinders, one within the other, leads from the 1,000-mc. generator. A high-frequency arc can be formed on the end of the antenna.

When certain gases, among them nitrogen and carbon dioxide, are fed past the arc, a flame about 9 in. long is produced. The arc breaks up molecules of gas atoms. These atoms joining together again on any surface placed in the flame give off heat.—Electronics, Feb, p120

Technical Shorts

Solders 8-, 9-prong Plugs—Thomas A. Edison Co. has developed a special soldering pot to solder 8- and 9-prong plugs, replacing resistance soldering of each prong separately. Non-acid flux keeps solder from running up sides of prongs; hollow pipe protects plug center. Clamp prevents cable and leads from shifting. Unit has raised production 55%.—Factory, Feb, p79

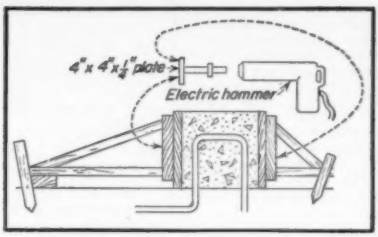
Better Spraying Plane—Use of makeshift planes for agricultural aerial dusting, spraying, and seeding is dangerous and expensive. Details for a suitable plane for such purpose would be: low-wing, minimum 200-hp. engine, effective operation at 60-70 mph., maximum payload of 2,150 lb., maximum takeoff distance of 1,000 ft. —Aviation Wk, Feb 13, p25

Low Sulphur Content — Diatomaceous earth makes foundry-mold insulating sleeves and neckdown cores low in sulphur. This mixture is good: 3¾ lb. diatomaceous earth, 12 oz. bentonite, 1 pt. resin (160 g. synthetic resin and 240 g. alcohol), and 2 qt. water.—Foundry, Feb, p130

Prevents Corrosive Etching — Specially coated chipboard will prevent corrosive etching that normally occurs on bottom sheet of stacks of sheet steel. Skid loaded with 8 tons went through steel strike with no sheet damage or weight indentation.—Iron Age, Feb 9, p11

Cuts Tile Warpage—Using zig-zag air flow through tile tunnel drier has reduced warpage at Jordan Tile Mfg. Co. Air traveling across drier is picked by circulating fans which reverse its direction.—Ceramic Ind, Feb, p71

Reduces Mine Downtime—Use of a grease truck at Trotter Coal Co. to service 8 loaders, 9 universal cutters, and 17 face machines has resulted in only three bearing failures in 18 months. Saving in lubricant was 65%. Grease truck is a self-propelled trolley-and-cable unit. Three compartments carry oil, transmission lube, and chassis lube.—Coal Age, Feb, p114



VIBRATES SMALL FORMS

Where standard vibrators are too large—as for smooth face on street curb concrete—a small electric hammer with a piece welded to pointing tool will suffice. Tool is run along header forms as indicated by dotted arrows. —Eng News-Rec, Feb 16, p46

How's Your Smog—Stanford Research Institute has made a blink-rate tester to check on air contamination (smog—smoke and fog). Phototube under eye goggles worn by test subject counts blinks of eyelid as various concentrations of contaminants are fed into the mask.—Electronics, Feb, p188

Removes Paraffin—Keeping oil-well-head flow lines free of paraffin deposits is no longer troublesome or costly. New method employs a soluble plug inserted into line through a special bypass valve. Plug cruises through line, pushing paraffin before it, and then dissolves in oil.—Oil & Gas J, Feb 16, p91

Shopper Lights Window—Berlin window shoppers can light display window at night merely by knocking gently on glass. Vibration turns light on for 3 min.—Business Wk, Feb 18, p20

More on Titanium—Enthusiasm for titanium as the cure-all for all metal structure problems may be dampened by results of recent Army creep tests. Both annealed and cold-rolled samples failed at stresses below yield point at room-temperature tests.—Prod Eng, Feb, p3

Fresh Prune Juice—University of California food technologists have developed a method to juice fresh prunes. Pectin makes fresh prunes of such heavy consistency that juice cannot be separated by pressing. So the pectin is destroyed by an enzyme after prunes are steamed.—Food Ind, Feb, pW13

More and More Power—Installed capacity of U. S. electric systems is expected to reach 92-million kw. by 1955. This is a predicted gain of 45% for the next 6 yr. To reach this goal will take continued high capital expenditures. Forecast for this year is $3¼-billion in construction facilities.—Elec World, Jan 30, p101 and 104

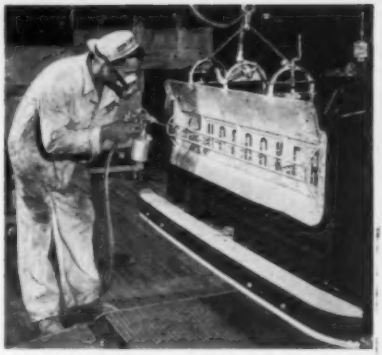
Reconversion Deals Common—Scarcity of sheet and strip steel is again making conversion deals common. Steel makers are refusing orders for second-quarter delivery. Overpriced steel can be had by those willing to pay the price.—Am Mach, Feb 20, p92

Helps Identify Buses—Shreveport Railways Co. uses odd-shaped symbols to help passengers identify buses for various routes. Symbols are painted bright yellow and are mounted on left front corner of the trolley bus.—Bus Trans, Feb, p83

Gas Turbine Proves Out—Oklahoma Gas & Electric Co.'s gas-turbine installation (see McG-H Digest, Nov'48,p24) has been in service 3,400 hr. Results: outstanding success, noise level satisfactory, maintenance low.—Power, Feb, p96

Rope Forms Scraper Slide—Cambria Jackson mine uses three old 1⅜-in. hoisting cables fastened to transfer drift floor to keep scraper from digging into floor. Cable ends were attached to logs. Former plank floors were more costly and took longer to place.—Eng & Min J, Feb, p149

Lightens Building—The 27-story Massachusetts Mutual Life Insurance office building will use light-gage steel floors and plaster and concrete made with lightweight aggregate. Building dead weight will be greatly reduced. Other advantages: saving in construction costs; elimination of plank working floors; lower maintenance costs, especially in relocating or extending electric wiring.—Eng News-Rec, Feb, p25



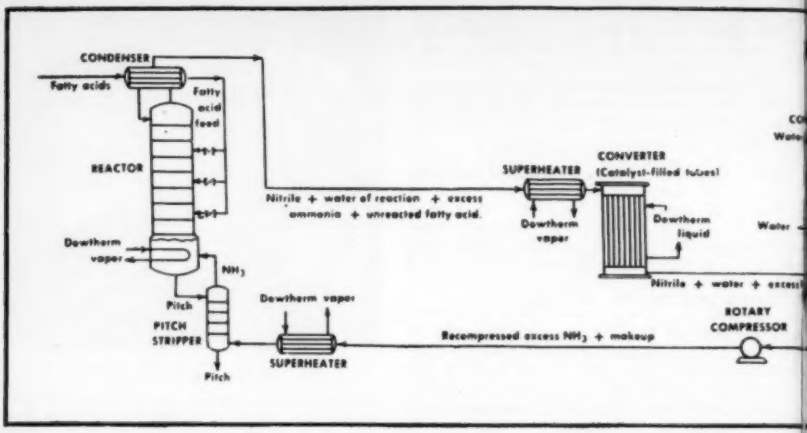
FAST PAINTING

At Studebaker Corp., truck tailgates are stencilled with 4⅜-in. high letters just before each truck leaves the assembly line. Metal stencils are air-clamped to tailgate, and letters sprayed with white enamel. Overhead spring balancer on stencil plate relieves operator of heavy lifting.—Am Mach, Feb 6, p83

Flexible Wiring — Hearn's Department Store, New York, uses Trol-E-Duct in window lighting. Previously employed only for commercial and factory installations, the continuous duct allows quick changes in display lighting, placing of flood and spotlights just where needed, and inexpensive alterations.—Elec C & M, Feb, p78

Floating Holiday—A. B. Dick Co. has one dateless holiday annually. Date for the "floating holiday" is set early each year. This year with Christmas falling on a Monday the "floater" will be the preceding Friday to give employees a 4-day holiday.—Factory, Jan, p134

Lap 0.001-in. Crystals—U. S. National Bureau of Standards has developed a method for lapping quartz crystals to a 0.001-in. thickness with satisfactory flatness and parallelism. Two variations of the square block and cell method can be used. Crystal is held to plunger by oil and then placed on lapping plate, confining crystal between piston and plate by cylinder walls.—Aviation Wk, Dec 26, p25



New Fatty-Acid Product Plant

Unique combination of processing units and the number of chemicals produced from fats, oils, and fatty acids make this plant outstanding

PRIDE AND JOY of Armour & Co. is its new fatty-acid processing plant at McCook, Illinois. The latest and most elaborate in the U. S. for processing fats, oils, and fatty acids, it has an unusual combination of units.

Raw materials are tallows, greases, fish oils, coconut oil, and fatty-acid fractions of cottonseed and soybean oils.

Finished chemicals are pure and mixed fatty acids, nitriles, amides, primary and secondary amines, and such amine derivatives as amine acetates and quaternary ammonia compounds.

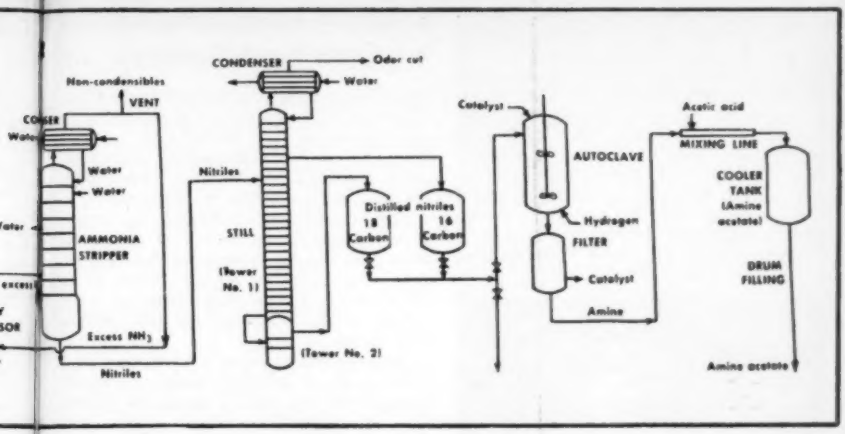
Major equipment includes fat-treating and splitting facilities, fatty-acid fractionating stills, nitrile converter and fractionating stills, evaporator, hydrogenation converter, solvent crystallization unit, hydrogen and nitrogen generation units, steam boiler plant, and water treatment facilities.

Fats and fatty acids are brought into the plant in tank cars. Refining and bleaching tanks are provided for fat stocks needing such treatment.

Fats are hydrolyzed in a continuous Colgate fat splitter at a rate of 5,000 lb. per hr. In this column, fat and water move counter-currently at 700 psi. and 500° F. Bottom product of the splitter is "sweet water", which is evaporated in a double-effect evaporator to produce crude glycerin.

Top product is fatty acids. These fatty acids and those shipped into the plant may go to distillation and hydrogenation. Or they may be refined by solvent crystallization. This part of the plant is not unusual.

But the nitrile production is unique (see flow chart.). Fatty acids for nitriles are not distilled. Instead they are passed to a bubble cap tower in which this reaction, $RCOOH + NH_3 = RCN + 2H_2O$, goes to about 80% completion.



Fatty acids first are preheated to 465° F., then fed into the reactor. Ammonia, preheated to 680° F., also is fed into the reactor. Pitch is the bottom product. Overhead is a vapor composed of nitriles, water of reaction, unreacted fatty acid, and excess ammonia.

The overhead vapor is passed through a superheater and a catalyst converter to complete the nitrile reaction. More than 99½% of the fatty acid is converted by having an excess of ammonia.

Water of reaction and the excess ammonia are stripped from the nitriles. The ammonia is recompressed in a rotary compressor and recycled to the reactor.

Crude nitriles from the bottom of the ammonia stripper as sold as such or distilled in two towers, built one over the other for economy. Actually it is a single column 65 ft. high and 3½ ft. in dia. with an upper and lower section.

The upper tower produces 16-carbon nitrile and the lower 18-carbon nitrile. Both nitriles are in vapor form. They go to separate tanks where they are stored under nitrogen.

Distilled nitriles may be sold or hydrogenated to make amines. Hydrogenation autocalves hold 10,000-lb. batches of nitriles. They employ a nickel catalyst.

High-pressure hydrogen is blown into the bottoms of the converters for 3-4 hr. to complete the reaction. Hydrogenation can be controlled to produce either primary or secondary amines.

Hydrogen for this conversion, as well as the fat and fatty-acid hydrogenation, is supplied from a reforming unit with capacity of 300,000 cu. ft. per day. The unit operates on natural gas.

Nitrogen—for blowing lines and equipment and for blanketing the nitriles in storage—is made in a generator burning natural gas and air.

From the amines, amine acetate can be made by a simple reaction with acetic acid. This is done in a mixing line just ahead of the drum filling station. A cooler tank provides ample time for completion of the reaction.

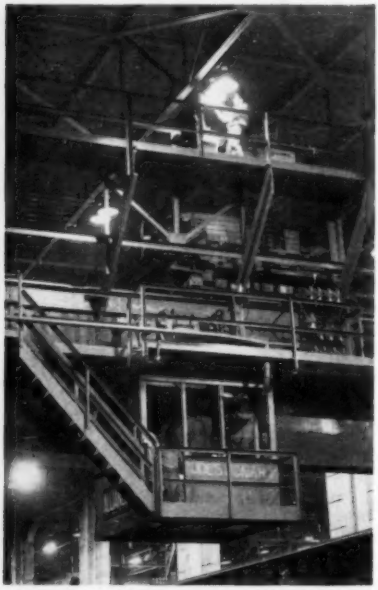
Plans are now underway to add facilities to make amides and quaternary ammonium compounds (now produced at another Armour plant).

The amides are made by reacting a good grade of fractionated fatty acid with ammonia under both high tempera-

ture and pressure in an agitated vessel.

The quaternary ammonium compounds are being made by reacting amines with methyl chloride or other organic chlorides. This process also is carried on in an agitated vessel under pressure and usually in a solvent. A continuous process for their production is now in pilot-plant stage at the new plant.

This last process, as well as the part of the plant now in operation, shows clearly the remarkable progress made in recent years in fatty-acid technology.—Chem Eng, Feb, p124 and p172



THIS IS SAFE MAINTENANCE

General Electric Co.'s turbine plant at Schenectady is lighted by mercury and incandescent lights 80 ft. above the working floor. To keep 45 ft.-c. throughout the high-bay areas, lights must be maintained constantly. Ample working area and waist-high railing protect maintenance men.—Elec C&M, Feb, p49

Graphite Molds Excellent for Centrifugal Casting

Graphite rod has been found at Allis-Chalmers Mfg. Co. to be a most desirable mold material for centrifugal casting. Its value is demonstrated by lightness, easy machinability, high heat conductivity, and low coefficient of expansion.

For nonferrous castings, no other material has been used that compares with graphite rod in economy for production runs up to 500 pieces. From 50 to 280 castings can be made from an individual mold, depending on size, shape, and metal.

Perhaps the greatest economy realized is in reuse of graphite molds. A mold made from rod can be machined larger in ¼-in. steps to produce successively larger castings. Remachining is continued until the mold wall becomes too thin or short.

In casting, the mold is preheated before pouring. This improves casting finish. Graphite rod can be applied effectively up to 500° F. As pouring temperature rises, mold life falls.—Foundry, Feb, p132

Converts Coal to Gasoline

The U. S. Bureau of Mines' coal-hydrogenation plant at Louisiana, Missouri, has just completed a 7-week "break-in" run. It has converted coal tar oil and Wyoming coal to gasoline and other liquid fuels.

Liquid fuels are produced in two stages. In the first stage, a paste of powdered coal and heavy oil is converted by hydrogen to a synthetic crude oil. In the second stage, the crude oil is hydrogenated to produce high-grade gasoline and other fuel-oil fractions.

The recent operations were carried out at 10,000 psi. and 850° F., producing gasoline, naphtha, and vapor-phase charging stock. The whole run was made satisfactorily.—Chem Eng, Feb, p180

Combines Chemical Processes To Make KCl and K_2SO_4

Installation and operation economies have been the result of combining tonnage production of potassium chloride and a new process for making potassium sulphate. Integration of the two processes has been done at International Minerals & Chemical Corp.'s Carlsbad refinery.

Muriate crystals are repulped in KCl brine and washed. Solids are mixed with water to make a slurry, which is clarified in a Dorr clariflocculator, polished on a plate and frame filter, and cooled in a crystallizer. KCl is precipitated, dewatered, washed, and dried.

Effluent from KCl process is mixed with langbeinite (K_2SO_4—$2MgSO_4$) and recycled salts. Solid 95% K_2SO_4 is precipitated, separated in a centrifugal, dried, and stored.

The effluent is partially evaporated and cooled. Solid salts are filtered out and recycled.—Chem Eng, Jan, p168

Helps Correct Driver's Errors

Markel Service Inc. shows bus drivers who violate safety regulations how those violations look to the bus passenger. The service photographs buses during the violations with a special camera mounted in a patrol car. In the developed print of the violation also appears a chronograph stop watch and speedometer.

Safety engineers have found that rules and regulations are not nearly so effective in correcting driver errors as are the pictures. The company uses the camera solely for driver correctibn, not for law enforcement.—Bus Trans, Feb, p80

Bascule-Type Crest Gates

Bascule-type crest gates have been installed on five U. S. dams to provide improvement over the type of pond control normally supplied by flash boards in the past. Gates range in length from 25–110 ft. and are 3-8 ft. in height. Gates consist of a curved gate leaf attached to a tube mounted on half bearings along the crest of the dam.

One advantage of the new gates is speed in lowering and raising the crest provided when gate is down.—Eng News-Rec, Jan 19, p44

100 HARMONICAS PER HOUR

This revolving turntable turns out 100 plastic harmonicas per hr. (see McG-H Digest, July '49, p28). Magnus Harmonica Corp.'s instrument has only five plastic parts instead of 150 machined parts in other harmonicas. Girls load hoppers with molded parts; machine applies the adhesive from glue pot, center. Assembled harmonicas are delivered by conveyor to automatic packaging unit.—Busines Wk, Feb 11, p50

New Aluminum Seal Primer

Improved seal primer for aluminum aircraft parts has demonstrated greater corrosion resistance than that provided by the conventional zinc chromate primer.

Developed by Northrup Aircraft, Inc., the new primer is sprayed over parts already coated with zinc chromate primer. It consists of a meduim-oiled synthetic alkyd resin, which seals the porous chromate primer and protects it from moisture.—Iron Age, Feb 2, p90

New Propeller Chops, Mixes

Cutter-propellers, such as employed in processing vanilla beans, must do two things: (1) sever solid materials present in the liquid medium and (2) operate with high propulsive efficiency.

A defect of the standard type of agitation propeller is that it loads itself with uncut material and then has to be stopped for cleaning. This condition can be avoided by making the desired angle of approach just a little greater than the ordinary angle of repose of material sliding down an incline.

A cutter-propeller made with such a curve has been quite successful in disintegrating vanilla beans. The blade remained clean and worked without any cleaning after chopping ton after ton of beans with no binder cord becoming entangled on the propeller or in the beans.

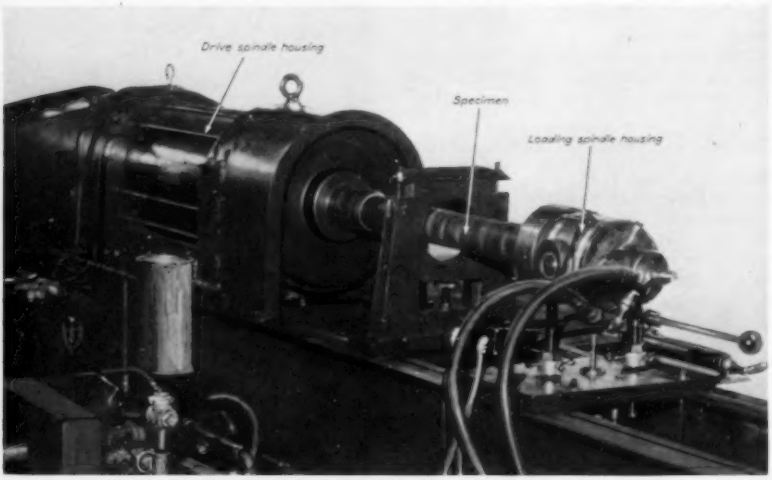
As a result of the disintegration, two of the four processing operations were eliminated.—Chem Eng, Feb, p 132

Deep-Draws 12-Gage Shells

Reverse drawing at Scaife Co. converts 12-gage, 38¾-in. dia. shells in one operation. Reduction is 63%, compared to conventional 40%. No anneal is needed.

The operation is actually two draws; the shell is literally turned inside out after the first draw. A hollow punch in the ram and a solid punch attached to the bolster plate do the reverse drawing.

The press, made by Hydraulic Press Mfg. Co., has a 200-ton die cushion, 84-in. stroke on the main slide, and opening and closing speed of 1,000 ipm.—Am Mach, Feb 6, p115



MACHINE TESTS OIL-WELL DRILL PIPE

Seamless steel pipe is subjected to simulated service conditions in this corrosion-fatigue tester. Specimen is mounted between drive and loading spindles. As the pipe rotates, it undergoes continuous stress reversals. Brine, simulating the corrosive muck always encountered in oil-well drilling, is pumped through the pipe during the entire fatigue test. National Tube Co. and Sonntag Scientific Corp. developed it.—Prod Eng, Feb, p102

Treaty – Pattern for Point 4

U. S. Uruguayan trade treaty is designed to encourage under-developed countries to remove their barriers to foreign economic assistance

THE NEW TREATY between the United States and Uruguay, now awaiting ratification by the U. S. Senate, is more than the usual "Treaty of Friendship, Commerce, and Navigation." It is that, but there are other noteworthy changes which bring it more into line with U. S. current economic and political objectives abroad and with business realities in the attainment of those objectives.

The title itself is changed in a significant manner. It is titled a "Treaty of Friendship, Commerce and *Economic Development*" (editor's italics). It becomes the model treaty for President Truman's Point 4 program (see McG-H Digest, July '49, p17).

The treaty rightly may be regarded as a statement of the government's desire for business participation in Point 4.

Secretary of State Dean Acheson, in submitting the treaty for ratification, said that it "was in line with the general objectives of the Point 4 program," and that it created a "legal framework within which business, trade, and cultural relations between the United States and Uruguay may, through liberal principles, develop efficiently and to the mutual advantage of the two countries."

First of Its Kind

It is the first comprehensive commercial treaty, not only with Uruguay but also the first with any Latin American country since 1927. It is significant too that the treaty has been made with Uruguay, a country that has a long history of experience with—and benefits from—foreign capital and business. Its record is of fair and equitable treatment of foreign capital and business.

Uruguay hopes for further gains from the treaty in the form of additional American private investments and enterprises. Although Uruguay is far more developed than most of the countries for which Point 4 is intended, the State Department hopes that this and other treaties with countries of similar economic development will convince less developed countries that they can remove some of their barriers to foreign capital.

This Is What It Will Do

The new treaty goes much farther than previous treaties in specifying the treatment and protection that foreign capital and enterprises will require to enter a country and contribute to its development. Important specifications are:

1. Firm commitments by the participating governments in regard to measures they will take to put their fiscal houses in order and to stabilize their currencies.

2. A detailed statement of principles governing fair treatment for foreign investors, to which governments would be firmly committed, and outlining also the obligations that investors would assume.

3. Measures on the part of the countries to permit free entry of foreign technical, managerial, and supervisory personnel.

4. Patents, trade mark, and copyright protection.

5. Satisfactory guarantees by other governments to private investors that their profits (and investments if liquidated) will be transferable in dollars with no discrimination between new and old investments.

6. An obligation on the part of the participating governments to negotiate with the U. S. regarding any alleged violation of these principles against a U. S. investor, with appropriate measures of settling disputes.

How To Layout Your Flame-Cutting Department

Proper layout of the flame-cutting department can reduce operating expenses. Here are eight suggestions on layout:

1. Calculate work load and select equipment according to amount of cutting to be done.

2. Determine oxygen source on basis of calculated work load—cylinder, cylinder manifold, outside trailer or tank for liquid oxygen.

3. Determine fuel gas. If acetylene, choose between dissolved acetylene in cylinders or acetylene generator.

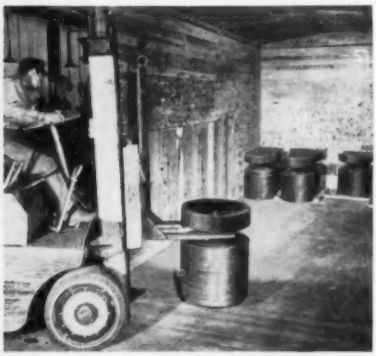
4. Select cutting machine according to type of work—straight-line, circular, or shape.

5. Select tracing method for shape cutting—mechanical, magnetic, or photoelectric.

6. Determine from tracer the type of templet—formed wire, milled groove, steel plate, or silhouette drawing.

7. Make provision for good shop maintenance.

8. Investigate cost of shears, nibblers, bandsaws. Don't flame-cut if mechanical cutting is cheaper.—Weld Eng. Feb, p28



HANDLES CURVED DISKS

Curved disks for agricultural implements are truck-handled at Crucible Steel Co.'s Midland plant. When disks are over 18 in. in dia., vertical stack is bolted through center with some disks reversed in the stack. Opening between concave and convex surfaces permits entry of truck forks. Result: box-car loading time cut from 40 manhours to 40 min.—Am Mach, Feb 6, p88

Raise Wool Spinning Limit

Both nylon staple and filament can be blended with woolen and worsted yarns to provide a finer, stronger fabric. Count limit of yarns spun on woolen and worsted systems is determined by weaving factors, not spinning factors.

Nylon staple, blended with wool, results in:

- Yarns produced on woolen system may be to finer counts; yarns produced on worsted system may be spun to limit of quality number or finer.
- For the same counts, on woolen system, an increase of 1% of nylon in blend results in 3% added strength. In worsted, the same nylon adds 3–4% yarn strength.
- Finer counts may be spun; even single yarns can be woven or knitted into lightweight fabrics.
- Resultant fabrics will have a measure of shrinkage control, depending on percentage of nylon used.
- Abrasion resistance is increased.

Tables of count-and-yarn-strength expectancy have been developed by tests on experimental yarns.—Textile World, Feb, p125

More Oil from Old Wells

Atlantic Refining Co. believes it can raise oil extraction from 45% to as much as 90%. Above-ground tests indicate it is possible. Field tests will start soon. Propane-rich natural gas, under 6,000-psi. pressure, would be injected into old wells. Gas dissolves trapped oil. Inflated globules then flow out easily.

Process is costly. Natural gas demands are large.—Business Wk, Jan 28, p25

New Bessemer Steels Show Better Machinability

New free-machining steels have been announced by Carnegie-Illinois Steel Corp. and Jones & Laughlin Steel Corp. Both are bessemer products intended for automatic screw machines.

Carnegie-Illinois' MX, made within chemical composition limits of AISI B-1113, has 0.08% carbon maximum, compared with the usual 0.10–0.13%. Silicon and manganese contents are closely controlled. Melting practice is regulated to yield globular sulphides.

The result of the controlled melt-shop practices is excellent machinability. One shop making automotive grease fittings has standardized on a 33% greater output when using MX steel, rather than B-1113.

Jones & Laughlin's E steel is made in three grades corresponding to AISI grades B-1111, B-1112, and B-1113. Carbon ranges from 0.04–0.06%. Machinability studies made in production work show that the steel can be machined 10–25% faster than the fastest standard free-machining bessemer screw stock.

The E steel is claimed also to show a smoother surface after machining, better cold-working and cold-forming properties, and longer tool life.—Iron Age, Feb 2, p79 and 86

Machine Reads, Tabulates

New measuring machine combines electronic computer technique with that of the printing telegraph. It records data by means of "log sheets."

Developed by Metrotype Corp., the machine is expected to be used on various continuous flow processes, such as steelmaking, gas transmission, oil refining. Readings of many different quantities—time, temperature, pressure, flow, voltage, current, counting—may be assembled in a single instrument and on one log sheet.—Steel, Jan 30, p72

MIDGET SCOOP, 'DOZER

Light-duty, gasoline-powered tractor unit serves as a scoop and bulldozer. Scoop is 36 in. wide, 14 in. deep, 12 in. high. Speed range forward and reverse is ½-6 mph. All operations are hydraulically controlled. Tractor weighs 800 lb. and has a similar drawbar pull. It is a Mead Specialties Co. development.—Eng News-Rec, Feb 16, p124

Gas-Filled Cable Feeders

When Tennessee Eastman Corp. had to install additional feeders to cover increased load at its chemical plant, low-pressure, gas-filled cable was selected. For 13,800-volt service, cable chosen was 3/C 500 Mcm Compact sector, with 130-mil paper insulation, shielding of 3-mil perforated copper band, over-all binding of 4-mil commercial bronze, with outer covering of 117-mil copper-bearing lead.

Major factors in selection were:

- Continunity of service.
- Supervised cable for warning in case of cable-sheath breaks.
- Cost compared favorably with standard paper-insulated lead-covered cables of same voltage.
- Installation and splicing time was only 15% higher than with standard solid type cable.
- One cable can be removed from service for checking or repairs.—Elec World, Feb 13, p73

New Products

Mercury Thermal System — Gas-fired ovens, glass-annealing ovens, high-temperature blanchers, and measurement of exhaust gases are only a few possible applications for 1200° F. mercury thermal system. Range spans of 1000°, 600°, and 400° F. are available.—**Taylor Instrument Cos.**—Iron Age, Feb 2, p35.

Nutless Fasteners—Prestolizing is a process for making fasteners by punching cone-shaped holes in sheet metal. Dies are installed in each piercing station of multi-punch hydraulic unit. Punched holes will engage screw threads of all popular sizes.—**Prestole Corp.**—Am Mach, Feb 6, p130

Arctic Heater—Lightweight, portable gas-turbine heater can produce 4-million Btu. per hr. with outside temperature at −65° F. Heated air is emitted through six adjustable outlets. U. S. Air Force will use units to preheat aircraft cabins, engines, ground equipment, and living quarters.—**AiResearch Mfg. Co.**—Aviation Wk, Feb 13, p34

ELECTRICALLY-LOCKED SWITCH

Flow of cartons, cases, and packages can automatically be merged and directed either to the right or left along a single conveyor line. When one of the electrically interlocked gates is held open by flow, the other gate blocks flow on second line. Adjustable deflector, adjacent to gates, automatically directs load. It is a development of Alvey-Ferguson Co.—Factory, Feb, p164

Waste Machine Gives Two Openings—Two opening actions are exerted on waste material in one passage through a new waste machine. It employs two sets of rolls—one in conventional position, the other is at bottom of cylinder. Waste opened in passage through first set of rolls is drawn into second set, then is deposited on apron. —**Kirkman & Dixon**—Textile World, Feb, p164

Ruggedized Tubes—Five new tubes for rough communication services have electrical and circuit applications similar to corresponding types. Design has been modified to give maximum service under unusual shock and vibration.—**Sylvania Electric Products, Inc.**—Electronics, Feb, p211

Stops Sticky Molds—A new silicone release emulsion—GE81161—prevents rubber and plastic parts from sticking to mold. It is applied to mold by spray gun or atomizer. Emulsion is stable to heat, hard water, freezing, and mechanical agitation.—**General Electric Co.**—Business Wk, Jan 28, p54

Telescoping Lift Truck—Lift truck is equipped with a 62-ft. scaffold lift. When nested, scaffold measures 20 ft. Operation is hydraulic except for lifting and lowering of platform. Scaffold platform is 3x12 ft. and has safety rails.—**Mixermobile Manufacturers**—Cons Meth & Equip, Feb, p120

Guides Film, Sheets—A tilting pair of nip rolls under constant pressure keeps plastic film or sheet material in perfect alignment as they are rolled. If edge of material moves laterally, a grooved wheel actuates the guiding function of the nip rolls.—**Mount Hope Machinery Co.**—Mod Plastics, Feb, p112

Industrial Power—Five power units are offered: two 6-cyl., two V-type 8-cyl., and one 4-cyl. internal-combustion engines. Optional are clutch, power takeoff, and 3-, 4-, or 5-speed transmissions. Units, mounted on skids, come with radiator and instrument panel.—**Ford Motor Co.**—Oil & Gas J, Feb 2, p78

Photocopying Unit — Photocopying of bound material is made possible by a pneumatic cushion that conforms the photographic paper to the contour of material being copied. Unit can copy opaque or translucent originals or translucent material with subject matter on only one side. Mirror simplifies reading reverse negatives produced by reflex methods.—**F. G. Ludwig Associates**—Eng News-Rec, Feb 16, p124

Raises Production 25% — Production is increased 25% on the new Model S-49 high-speed, multi-design ribbing machine. Fancy design fabric patterns can be changed in ½ hr. Three different designs can be set up in the patterning mechanism at once.—**Fidelity Machine Co.**—Textile World, Feb, p172

For Pressure-tight Welds—New Airco No. 718 aluminum brazing wire is claimed to produce welds able to withstand pressure with fewer leaks. It comes in dia. of 3/32 and ⅛ in.—**Air Reduction Sales Co.**—Weld Eng, Feb, p45

Heats Liquids—Portable tank immersion heaters are rated 2-18 kw., 115-550 v., single or three phase. Copper, steel, Inconel, or stainless-steel sheath are available, depending on corrosive nature of solution to be heated.—**Edwin L. Wiegand Co.**—Elec West, Jan, p38

Life-lubricated Motor—Brake motors feature prelubricated-for-life cartridge bearings. Brake linings are not affected by heat, cold, water, fungi, grease, or oil. Intended use is for applications requiring frequent instantaneous stopping and starting.—**Crocker-Wheeler Electric Mfg. Co.**—Steel, Feb 13, p121

Waterproofs Paper—Silicone DC 1107 makes paper water repellent and nonadhesive to rubber, asphalt, and pressure sensitive tapes. It can be applied by dip, roller, or size press. Paper does not change texture or color.—**Dow Corning Corp.**—Paper Ind, Jan, p1246

Hot-materials Conveyor—Carcass of a new hot-materials conveyor belt is made of multiple plies of glass fibers plus heat-resistant cover. One belt has given 14 months of service in a foundry.—**Lee Rubber & Tire Corp.**—Ind Dist, Feb, p120

PORTABLE ELECTRIC SAW

This lightweight, portable saw uses a ¼-in. electric drill for power, eliminating gears and other connecting mechanisms. Aluminum-alloy casting contains saw blade guard, bearing for arbor, and handle. It is indexed for straight cutting; both sides of plate are machined so saw can be used for rip or dado cutting. It weighs 1½ lb. Saw is a development of Portable Electric Tools, Inc.—Ind Dist, Feb, p108

Aluminum-felt Roofing—A 17½-in. wide strip of stipple-embossed aluminum laminated to one side of a 36-in. width of 15-lb. asphalt-saturated felt provides a light-, moisture-, and sun-proof roofing material. In laying, each course is overlapped, thus providing a double layer of felt. It is claimed to reflect up to 95% of the sun's radiant heat.—**Reynolds Metals Co.**—Factory, Feb, p150

Shakes Out Coal—Coal cars can be emptied by one man in a matter of minutes with a new 5-ton twin- or single-hook hoist. Double safety is provided by interlocking controls.—**Materials Handling Div., American Engineering Co.**—Coal Age, Feb, p131

Table-top Water Softener—Tapwater is converted to the equivalent of triple-distilled water by a new table-top water softener. Water, on a batch-load basis, has an electrical resistance of 10-million ohms. Glass fibers remove physical impurities; mixed resins remove and retain salts causing hardness.—**Crystal Research Laboratories, Inc.**—Business Wk, Jan 14, p72

New Products (Cont.)

Softens Water—Cold-process,, slurry-type precipitating softener and coagulator employs hydraulic energy to mix applied chemicals with previously formed precipitate. Flocculation occurs without need of submerged mechanical moving parts.—**Worthington Pump & Mach. Corp.**—Oper Eng, Feb, p72

Produces Fertilizer Pellets—New pelletized fertilizer process employs rotary granulator that is similar in appearance to rotary dryer. It produces fertilizer granules capable of long storage without caking, thus allowing manufacture in advance of market demands.—**Sturtevant Mill Co.**—Chem Eng, Feb, p149

Three-legged Tamper — New backfill tamper uses three tamping legs in place of the standard one. Legs have less than ½-in. vertical movement. Tamper requires an air pressure of 100 psi.—**Gunderson-Taylor Machinery Co.**—Cons Meth & Equip, Feb, p93

Felt-point Pens—Indelible inks can be written on cellophane, wax, metal, and other surfaces with a new felt-pad pen point. Ink dries instanly.—**Marsh Stencil Machine Co.**—Hardware Age, Feb 9, p195

Stops Galvanic Action—Annealed aluminum tube fittings do not cause the galvanic action common with brass fittings used with aluminum. Advantages: no corrosion plus those of its self-flaring feature.—**Scoville Mfg. Co.**—Prod Eng, Feb, p176

Modular Stove—Universal Select-A-Range is of modular design. Three basic interchangeable, self-contained units — oven, surface cooking unit, and drawer unit—can be fitted into more than 25 different arrangements to suit the kitchen.—**Landers, Frary & Clark**—Elec Merch, Feb, p143

Steel Clamps for Wood Curb Forms—New steel form clamps permit combination of advantages of steel-form design and cheap wood form material. Clamps are adjustable for curb top width from 4-8 in. and batter from vertical to any angle.—**Pacific Engineering Sales Co.**—Eng News-Rec, Feb 2, p106

Micrometer for setting the base diameter of the yarn. Adjustments can be made for all yarn counts
Indicating meter gives average variation in the yarn in thousandths of an inch from the base setting
Slot through which the yarn passes for measurement
Scale control
Set control
Flexible cable to control box

CHECKS YARN DIAMETER

This 3½-lb. portable tester checks yarn diameter as it is spun on spinning frame. It gives spinner an immediate indication of individual yarn diameters. Complete inspection takes only a few seconds. Yarn is tested between nip roll and pigtail. Meter is graduated in thousandths of an inch. It is a development of Standard Electronic Research Corp.—Textile World, Feb, p163

High-capacity Freezer—Continuous quick freezer handles 1-lb. packages of food at 4,000 per hr. or hardens 8,000-pt. packages of ice cream. Food is carried through freezer on tray shelves. Unit is 22x19 ft. and 8¾ ft. high.—**Freezing Equipment Sales, Inc.**—Food Ind, Feb, p108

Locomotive Crane—A new 25-ton diesel-electric locomotive crane uses diesel power for deck operations and electric power for trucks.—**American Hoist & Derrick Co.**—Railway Engrg & Maint, Feb, p156

Guild Saw—Model A-8 saw, weighing only 13½ lb., is for general construction work, heavy-duty cross-cutting, and ripping. Maximum depth of cut is 2⅞ in.—**Porter Cable Machine Co.**—Am Builder, Feb, p89

Timing Relay—Pneumatic relay has synthetic-rubber bellows to control tripping time. It resets instantaneously. Range is adjustable from 10 cycles to 3 min. with accuracy of ± 10%.—**Allen-Bradley Co.**—Power, Feb, p150

Vehicular Fire Extinguisher—New 2½-gal. Foamite fire extinguisher is 65% stronger than other shell-drawn units, is twice as strong as welded silicon bronze, is 2½ times as strong as fabricated copper extinguishers. It has a shell strength of 1,400 psi. It is activated by twisting sealed stopper in top.—**American-La France-Foamite Corp.**—Bus Trans, Feb, p198

Multiple-drill Unit—Drilling and tapping unit is made of multiple-spindle adjustable drillhead and automatic reverse-tapping attachment. Models have 2-10 spindles, adjustable from ½-in. minimum centers within 10¾-in. dia. circle.—**Thriftmaster Products Corp.**—Am Mach, Feb 6, p136

Vibrating Conveyor — Mechanically vibrated trough conveyor handles wide range of materials at speeds up to 100 fpm. It requires only 14½-in. head room. Many construction variations are available.—**Stephens-Adamson Mfg. Co.**—Chem Eng, Feb, p144

Diaphragm Control Valves—Series 2000 Saunders Patent valves, in sizes up to 12 in., handle corrosive fluids or gases or any slurry or fluid carrying suspended solids. Of packless type, valves can be supplied with cast-iron bodies and with rubber, glass, or lead lining.—**Hammel-Dahl Co.**—Oper Eng, Feb, p70

High-vacuum Pump — Model MCF-300 fractionating oil-diffusion pump provides speed of 300 liters per sec. in range of 10^{-5} to 10^{-3} mm. mercury. Ultimate vacuum is 5×10^{-7} mm. of Hg at 25° C. Casing has 4-in. inside dia.—**Distillation Products Industries**—Nucleonics, Feb, p95

Controls Motor Speed—Motor, speed-varying mechanism, and reduction gears make up the 1000 Series Motodrive. Hp. ratings are ¼, ⅓, ½, and ¾. Speed variation is 10:1. Motors are squirrel cage.—**Reeves Pulley Co.**—Elec World, Jan 30, p164

Duplex Slush Pump—D-850 pump meets specialized mud-circulating needs of deep oilwell drilling. Rating is 850-hp. input at 60 rpm. Capacity is 933 gpm. at 1,328 psi. Liner dia. is 8¼ in., stroke 18 in.—**Emsco Derrick & Equipment Co.**—Oil & Gas J, Feb 16, p131

AIR-SHOOTING SYSTEM

Covel Mfg. Co.'s new Armstrong air-shooting system consists of this lightweight shell, easily handled at face, and a compressor. Coal produced has fewer fines, is easier to handle and load. Coal size is varied by changing pressure on shell. Shell is inserted in a 2¾-in. hole, and compressor is trammed to within 75 ft. of face. Sudden release of high-pressure air from shell breaks down coal.—Coal Age, Feb, p122

Portable Pipe Threader—Actually a 20:1 gear reduction unit, threader is driven by any ½-hp. electric drill. Unit weighs 14 lb. One operator with unit can thread up to 6-in. conduit in any position.—**Muncie Gear Works, Inc.**—Elec Whols, Feb, p100

Converts to Diameters—Flexible steel rule converts circumferences to diameters up to 21 in. Reading is on one edge of rule from left to right.—**Carlson & Sullivan, Inc.**—Factory, Feb, p166

All-weather Rubber Mountings—Silicone rubber mountings for delicate instruments will withstand a temperature range of −100 to 500° F. The "Cohrlastic" mounts are available in various sizes.—**Connecticut Hard Rubber Co.**—Aviation Wk, Jan 30, p35

READER SERVICE

As a special service to our subscribers, McGraw-Hill Digest will furnish without any charge additional information about any new product or technical development described. Address your letter to: The Editor, the McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y. U. S. A. —*THE EDITORS*

Check Phosphorus in Steels

Phosphorus content of molten steel bath can be determined accurately in only 2 min. by spectographic method using photoelectric tubes

PRODUCTION CONTROL of phosphorus in steel made at Ford Motor Co. depends on spectrographic technique plus photoelectric counter tubes. Phosphorus can be measured in 2 min.

Equipment in Ford laboratories include: (1) an electrical-arc source; (2) a large Littrow quartz spectrograph; and (3) Geiger counter attachment. No dark room for photographic processing or microphotometering facilities are needed.

The excitation source is preferably an arc, because the phosphorus line used (2136.19 angstroms) is of high-arc intensity and is situated close to a copper line (2135.97 angstroms) of high spark intensity. Also, arc excitation does not interfere electrically with the electronic measuring circuits.

The spectrograph has quartz optics adjusted to bring the "tenth region" into focus. To control instrument temperature and to prevent shifting of spectral line positions, the complete spectrograph is enclosed in an insulated wooden cabinet with constant temperature control.

Two Geiger counters are attached to the spectrograph at the plate-holder position. They replace the usual photographic plates.

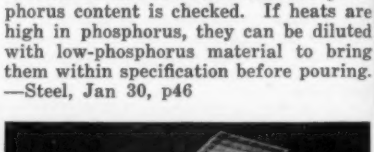
Tubes are small—12 cm. long and 13 mm. in dia. Cathode is nickel alloy, and anode is tungsten wire. Envelope is filled with hydrogen at 10-cm. pressure. Accurate counting can be done to 3,600 equally spaced and scaled counts per second.

The molten steel to be analyzed is poured into molds to make rod-shaped self electrodes of $\frac{1}{2}$-in. dia. Ends are ground off to form a 90° conical burning tip on each electrode. Sharp conical tips cause arc wandering.

An arc is formed and held for 1 min. Exposure is terminated at the end of 100 reference counts. Phosphorus counts can then be plotted directly against phosphorus percentage, thus avoiding the calculations of the phosphorus-iron ratio.

The installation in the Ford foundry checks the electric-furnace steel for crankshafts as well as the cupola heats. Over 7,000 heats have been analyzed.

An operator can make 30 determinations an hour. This analysis speed permits effective control because heats can be held in the furnace until the phosphorus content is checked. If heats are high in phosphorus, they can be diluted with low-phosphorus material to bring them within specification before pouring. —Steel, Jan 30, p46



LIGHT LEADS VISITORS

This S-shaped run of cold cathode tubes in Philadelphia office buiding leads visitors from outside to inside foyer. Four 25-mm. warm-white tubes in recessed ceiling are covered with white egg-crate louvers.—Elec World, Jan 30, p162

Highlights of Home Building

The National Association of Home Builders' Exposition held in February captured the interest of contractors by its diversity of new products. Here are a few:

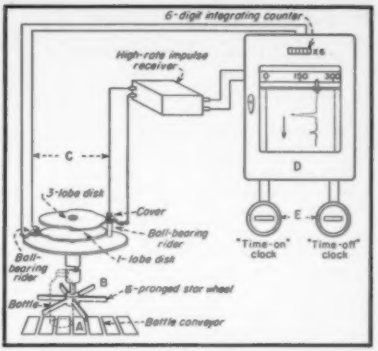
Rod-type concrete form tie with spreader is said to cut the cost of building forms by more than half.

Concrete forms made of magnesium are claimed to last longer, go up faster, and be more accurate than wood forms.

A variety of heating units included a new gas or oil furnace designed especially for radiant perimeter heating. Several other furnaces for small or basementless houses are claimed to increase heating efficiency and to cut fuel consumption.

A new hardboard paneling looks like Spanish leather. Other hardboard panels are surfaced with laminated plastic in color.

Improved prefabricated chimney is lighter and cheaper to install.—Am Builder, Feb, p80.



RECORDS BOTTLING RATE

Beer bottling at Olympia Brewing Co. is checked by this recorder. Bottles traveling on conveyor A turn star wheel B. This produces impulses that travel over wire C to recording potentiometer and integrating counter D. Clocks E indicate total "on" and "off" time. The instrument has increased operating-time efficiency by more than 5%.—Food Ind, Feb, p61

Hot Forming 75S-T6 Alloy

Forming 75S-T6 aluminum alloy after heat treating avoids serious problems of warpage and dimensional changes. But forming of heat-treated parts must be done hot, which introduces the additional problem of maintaining a critical temperature.

Uniform heating throughout the mass of the part is necessary. Engineers at Northrup Aircraft, Inc., believed resistance heating offered the greatest promise and so investigated it thoroughly.

Tests conducted on Sciaky heating equipment led to these results:

1. Heating to 300° F. has no effect on physical properties. Heating to 400° F. produces substantial physical property loss.

2. In comparing d-c. and a-c. equipment, variation in material properties are practically the same, odd shapes are heated to the same uniformity, and the greatest difference arises in investment costs.—Prod Eng, Feb, p85

Better Mold Liners Studied

Rapid wear of mold liners in the mechanical pressing of refractory brick is a severe abrasion problem. Chisholm, Boyd & White Co., to find the best lining material, sponsored a project at Armour Research Foundation.

About 75 different materials and heat treatments were investigated.

High-carbon, high-chromium steel has been found so far to be the best material. Complete removal of mill decarburization and correct heat treatment are mandatory. Tests on tungsten-carbide liners however are still underway.

Other potential lining materials are boron carbide and sintered aluminum oxide.—Iron Age, Feb 9, p79

Autos to Cake Mixers Cause Video Interference

Ignition systems on old automobiles is the major offender. Distributor-type suppressors reduce the interference. Resistor-type spark plugs practically eliminate it.

Second worst offender is old-type, self-excited, self-rectified diathermy equipment operating at random in the r-f. spectrum. Two methods reduce interference: (1) shielding the equipment and treating areas, and (2) altering frequencies that produce interference.

Old-type tungsten-filament lamps may omit oscillations that result in two horizontal bands across the picture. They act as dynatron oscillators. Remedy is to get rid of the lamps.

Some germicidal lamps cause extreme interference because they radiate a signal on being energized at an r-f. voltage. This type of lamp is no longer made, but some are still in use.

Other major causes of interference include radio transmitting equipment, electronic door openers, dielectric heating equipment, and household appliances, particularly those with commutating motors and thermostats.—Elec World, Jan 16, p55

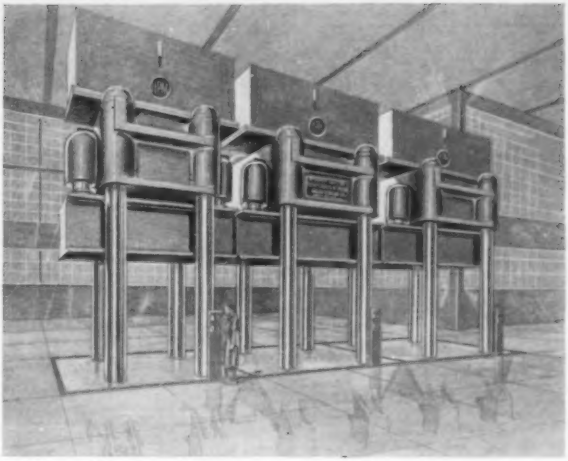
Cools Leafy Vegetables

Tests on leafy vegetables show that rapid cooling is essential if immediate blanching and processing is not feasible. This fact adds interest to new methods of vacuum cooling.

In field tests by U. S. Dept. of Agriculture, lettuce was cooled from 70° to 33° F. in 22 min. Cooling is accomplished by spraying water on the lettuce and evaporating it. The process may be ready for commercial use this year.—Food Ind, Feb, p9

ATTACHMENT ADAPTS BULLDOZER TO SHOVEL WORK

Attachment of this ½-cu. yd. shovel unit on Caterpillar D7 and D8 tractors permits retention of 'dozer blade usefulness. Mounted on new or used equipment, the unit has a 16¾-ft. boom and an 11¾-ft. dipper stick length. Dipper bail speed is 81 fpm. It is a Hyster Co. development.—Cons Meth & Equip, Jan, p93



GIANT PRESS

National Tube Co. will install this huge hydraulic press of 18,000-ton capacity to enlarge its facilities for making steel pipe. The press, being built by Hydraulic Press Mfg. Co., is combination of three 6,000-ton units. Final weight will be over 1-million lb. One operation will need 5,100 gal. of oil. Die mounting surfaces measure 54x492 in. Press will be self-contained unit with hydraulic pumps and electric-motor drive.—Am Mach, Feb 20, p140

Industrial Pulse Brazing

In manufacturing ultra-high-frequency vacuum tubes, Eitel-McCullough, Inc. ran into trouble in brazing anode assembly to grid-cathode assembly. Heating the joint caused damage to other metal-to-glass seals within the tube.

Pulse brazing by induction heating was tried and proved satisfactory. Enormous peak power values are obtainable when pulses are short. Another advantage is the small size of equipment; a 15-kw. radar-pulse electronic brazer can be housed in a cabinet 24 x 30 x 50 in.

Pulse brazing differs from normal high-frequency induction heating only in the application of a greater peak power to the work for a short time duration. Conduction of heat to other parts of the work is thereby reduced.

The equipment developed for the job supplies 15 kw. at 400 kc. for 0.3 sec. In this fraction of a second, sufficient heat is generated by the induced current to melt the brazing alloy preform. The operation is carried on in a hydrogen atmosphere to reduce oxide formation and keep surface clean.—Electronics, Jan, p78

Props Ease Ship Steering

Twin propellers replace conventional rudder shaft tube, skeg, and conventional steering mechanism on a new ship designed by Defense Department's Transportation Corps. The propellers are Voith-Schneider cycloidal units that improve maneuverability. Each propeller is a rotating disk set flush in an opening in the hull bottom. Blades around periphery give a sculling motion like an egg beater. —Prod Eng, Feb, p149

Ceramic Contracts in Heat

A lithium alumino-silicate compound, developed by Stupakoff Ceramic & Mfg. Co., defies physical laws by contracting when heated, expanding when cooled. The material can be formed and shaped by conventional methods, machined to close tolerances.—Ceramic Ind, Feb, p71

How To Cut Costs

Plan, Control Your Production

GOOD PRODUCTION CONTROL means more production from the same number of machines and men at lower unit costs. The Prime objective of production control is to get the needed production when you need it. You can use two basic approaches —two key controls. There are many variations in approach and control. Your choice will depend on your industry—whether it is flow, intermittent, or job shop.

Some plants gear production to plant capacity. The plant itself is the limiting factor. The plant makes what it can when it can. Sales force sells what the plant turns out. Production planning, volume, and timing are limited by the capacity.

This is the job-shop approach. Some plants with standard products, however, use the approach.

The other approach is the sales-dominant approach. Here sales forecasts determine production. Schedules dictate the machines and capacities. The necessary factory space must be procured, and machines bought and installed to meet the figures set by the sales forecast.

Both approaches are sound and proper under certain conditions.

Two key control systems are available —stock-level control and schedule control. In the former, manufacturing orders are placed to maintain certain levels of stock. This may be finished stock ready to ship or it may be parts ready to assemble.

With schedule control, blanket or monthly orders are made to specify quantity for each day or week. It is closely related to estimated sales.

Let us first decide what we mean by flow, intermittent, and job-shop industries. Decide which your business is.

Flow is illustrated by the chemical plant. Or a large-scale shoe factory or the automobile plant. An intermittent plant is one where the same machine turns out one product and another the next. There is storage of semi-finished parts and materials prior to assembly or prior to finishing. The job shop is a shop that makes a product only after that specific product has been ordered by the buyer.

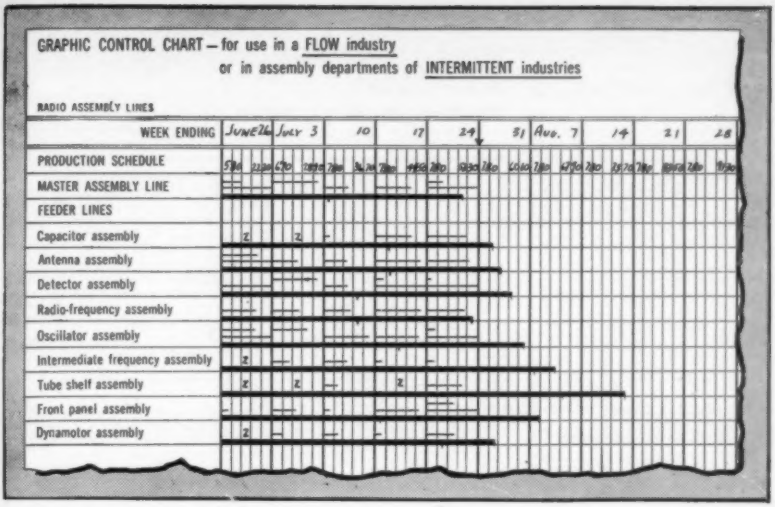
If Yours Is a Flow Industry . . .

. . . you begin with a sales forecast. Then you procure the equipment necessary to fulfill the forecast. Production planning function, in the main, is performed before the plant goes into operation. Once production starts, control consists primarily of seeing that production meets schedules and in overcoming production delays.

The production control department must know machine capabilities to order equipment needed. It must know what raw materials are needed by kind and size. It must estimate the number of workmen needed to operate the machines.

Setting Dates Biggest Problem

The big job is setting up dates, that is, dates for procurement of equipment, dates for purchase and delivery of materials, dates for addition of personnel. Each item that is listed on the chart has



at least two dates—date wanted and start date.

Graphic planning is necessary and vigorous follow up is a must.

Production control against planning is simple when only one or a few products are manufactured or when the plant has been well engineered. But it is not always possible to engineer all operations to avoid blanks in work between some operations. The blanks can be kept at a minimum by slowing or stopping the operation ahead of the blank or speeding up operations after the blank.

The Gantt chart (see above) can help you control such situations. The chart shows graphically how production of radio sets both on the master assembly line and on subassembly lines is progessing.

The figures at the top are weekly schedule quantities of complete sets and the accumulated total. The light horizontal lines are the percent of the weekly schedule completed each week. The "Z" means no production was completed on that subassembly during the week as indicated above.

The heavy line is the accumulated total —both subassemblies and complete sets —against the accumulated total in figures. The "V" at the top of the chart is the date on which the chart was last posted. Thus we see that the master line was 2 days behind schedule when the chart was last posted.

The line "tube-shelf assembly" is well ahead of schedule, whereas the line "radio-frequency assembly" is in dangerously short supply. Unless production of the latter subassembly is increased, the entire master assembly line may have to be closed down temporarily until radio-frequency assemblies catch up.

Orders calling for slight variations in specifications from standard can be run as separate batches with this control system.

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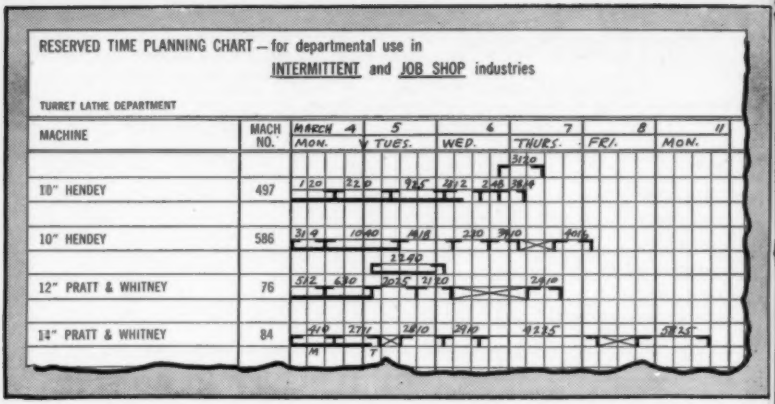


If Yours Is an Intermittent Operation . . .

. . . your job is more complex. This is because each piece of equipment is not designed to perform a single operation on one part. A weave shop or printing shop is a good example of an intermittent operation. Reserve-time planning must be employed to keep production flowing in such an operation. Here you simply allocate future time available on each machine to work to be done.

With reserve-time planning you are able to take into account the capacity of each piece of equipment. Unless you plan in advance the use of available time on each machine, you cannot know whether an order exceeds the capacity of a given machine.

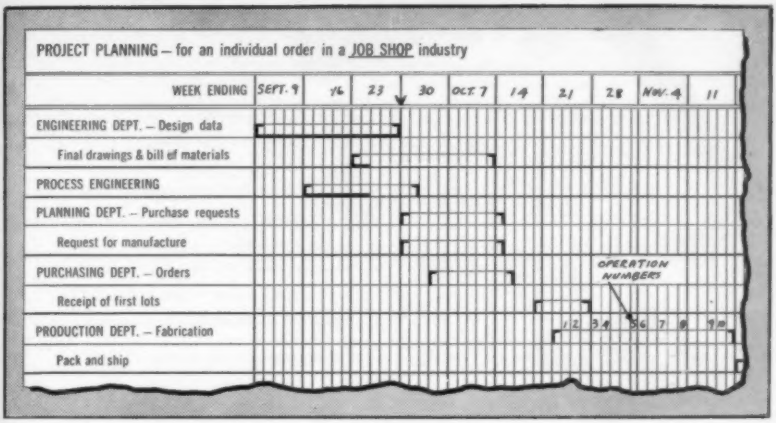
It will help if you decentralize the planning to the manufacturing departments. Some plants are putting more and more planning responsibilities in the hands of foremen, giving them all the help necessary.

The reserve-time planning chart (see above) is kept in the foreman's office. Central production control issues orders that merely tell when work is wanted from the foreman's department. The foreman estimates when the order should start to be completed by wanted date. Work must be planned 2 or 3 days ahead on the chart.

Rectangle Means An Order

Each planned order is represented on the chart by a rectangle open at the bottom. Length represents the time it will take to complete the job on that machine. When the order is finished, the bottom of the rectangle is closed. The "V" at the close of business March 5 shows the situation as to work planned and completed at that date. When work gets ahead of schedule, the next job can be overlapped on the line above. This was done on Machine No. 497.

Capacity study tells what assembly schedules are possible, where capacity is tight or in excess. Studies follow set plan. After they are instituted they need only seasonal posting.



If Yours Is a Job-Shop Operation . . .

. . . you will be capacity-minded in your approach to production control. The volume of business is limited by capacity. Capacity controls your delivery dates.

Your key control is by schedule—not a schedule based on sales forecasts, but a schedule set up for each order as it is received. The technique will again be reserve-time planning. Only by reserve-time planning can you schedule your operations and make your deliveries as promised.

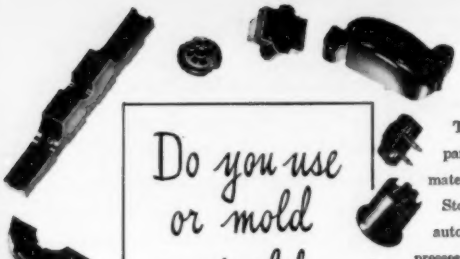
In the job shop you must prepare an estimate that includes the sequence of operations and the time needed for completion of each operation. This should be the same estimate used to determine customer's price. It provides the basic data for the reserve-time planning.

Reserve-time planning takes care only of production operations. Production-control department will include project planning. This is the same technique that was required for pre-production planning in the flow industry.

A builder of special machinery may start with the design of the machine. Designing and drafting become the first steps then in project planning.

The project planning chart (see above) is for the job-shop industry that requires engineering and special materials before manufacturing can begin. Time objectives of each department are indicated by the dark lines at the ends of the rectangles. Progress is shown by the heavy line. The heavy progress line compared with the "V" at Sept. 23 shows the drafting and process engineering work to be 3 days behind schedule.

Charts are by no means the only method of production control. Many other graphic tools are widely used, including mechanical boards and wall pockets. But charts have many inherent advantages over other control methods. They are completely flexible. If a change is made necessary, there is a record of the schedule before the change. They can be made in almost any size that may be required. They are easily moved.—Factory, Feb, p100



Do you use or mold parts like these?

These plastic parts, of thermosetting materials, are *all* molded on Stokes molding presses . . . fully automatic presses; semi-automatic presses; closure, plunger and button presses. The parts, of all sizes and shapes, are both simple and complex, but all are accurate in dimension.

Stokes plastics molding presses are modern, productive, cost-saving units . . . recommended for precision molding of a wide range of general molding work. Throughout the world, Stokes molding presses cut costs, save time and material.

Assistance in the selection of the right molding press, auxiliary equipment, proper molding compounds, and mold design or complete molds . . . even complete plant layout . . . is available through the Stokes Advisory Service.

Write or cable for help on your molding problems . . . and profit by Stokes extensive experience in plastic molding techniques.

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Production Ideas

from Manufacturers' Catalogs

4-1 Fluorescent Fixtures—Sylvania Electric Products, Inc. 72p. Two basic designs, five models, and seven mounting methods are claimed to fulfill all fluorescent demand. Drawings and pictures show possible fixtures and combinations. Catalog No. C 478.

4-2 Lubricants for Diesels—Socony-Vacuum Oil Co. 58p. Diesel engines are discussed. How, where, and what to lubricate and what to use is given in four-color drawings.

4-3 Modular Building Blocks—Besser Manufacturing Co. 28p. Available modular building blocks are pictured in Bulletin No. 56-8M-10-48 as well as typical installations. All block dimensions end in ⅝ in., which added to ⅜-in. mortar joint gives even inch dimensions.

4-4 Bronze Bearings—Johnson Bronze Co. 84p. Parts Catalog No. 500 gives a complete line of bronze bushings, bearings, bar bronze, and babbitt.

4-5 Hardware—Stanley Works. 297p. Catalog No. 61 shows complete line of hinges and installation drawings, bolts, braces, supports, hangers, and garage doors.

4-6 Diesel Crawler—International Harvester Co. 24p. Construction details, job applications, operating efficiencies, attachments, and specifications for the 140 draw-bar horsepower TD-24 diesel crawler tractor presented.

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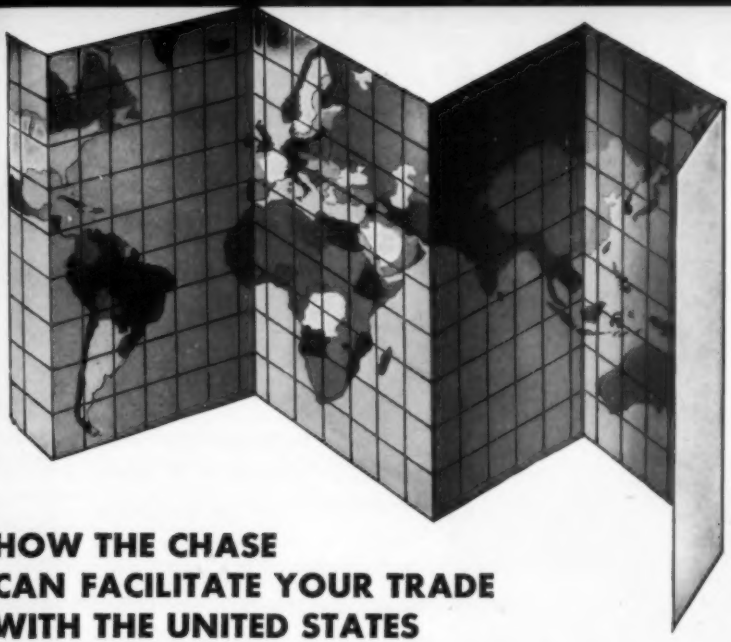

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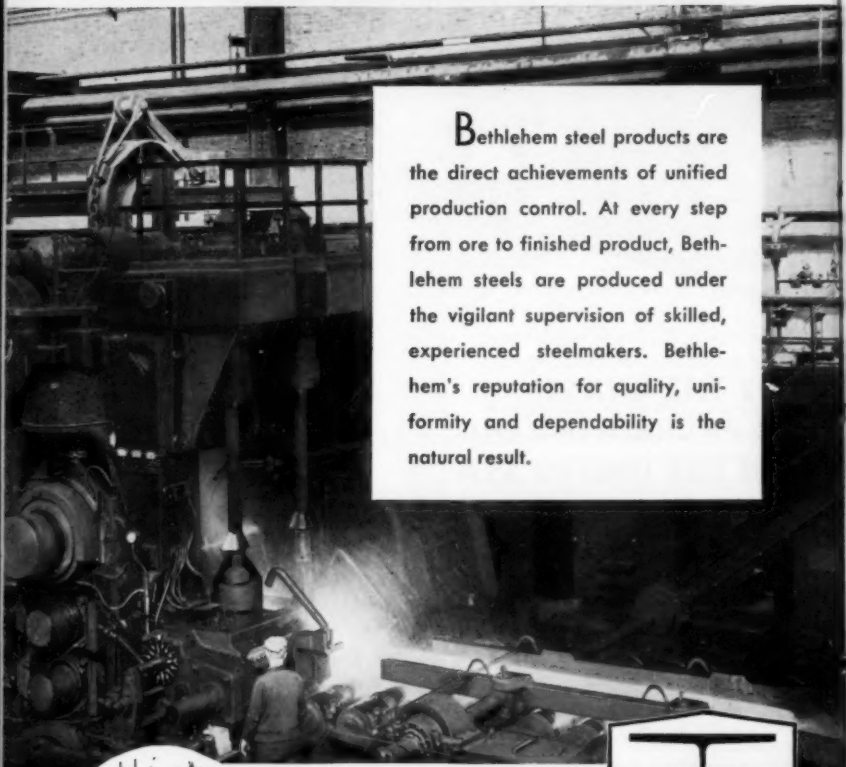

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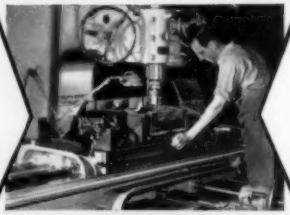

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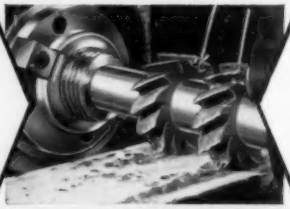

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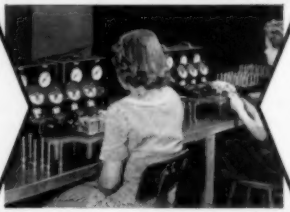

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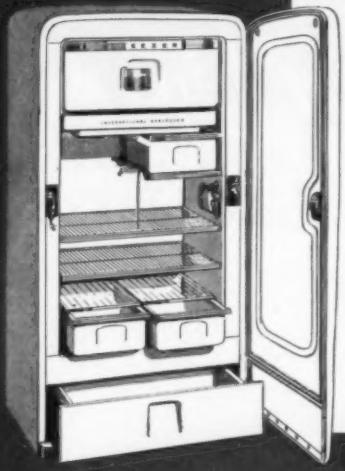

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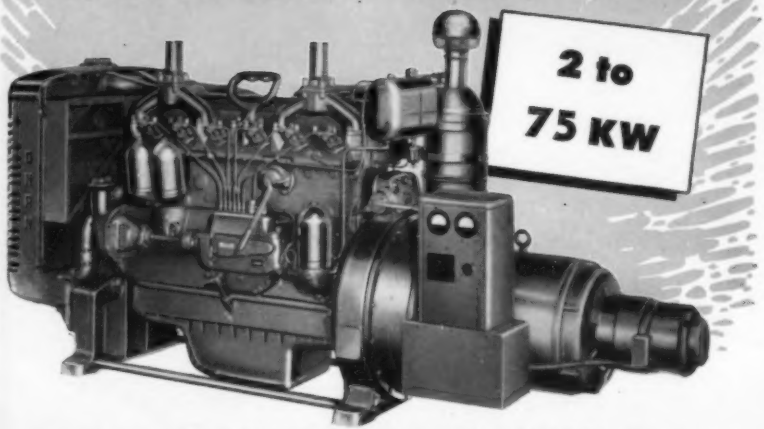

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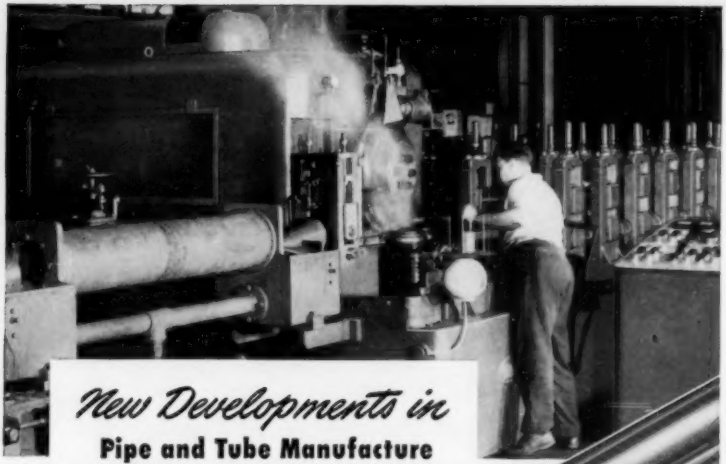

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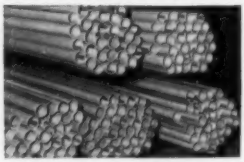

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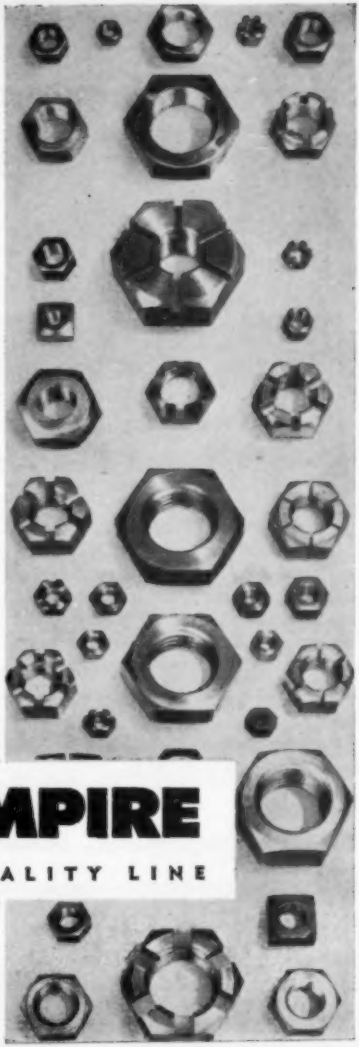

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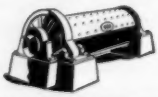

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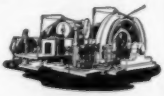

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By JOHN R. IMMER, Assistant Professor of Industrial Management, School of Business Administration, University of Minnesota. *McGraw-Hill Industrial Organization and Management Series.* 430 pages, $5.00

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By W. D. COCKRELL, Industrial Engineering Divisions, General Electric Company. Second edition. 385 pages. $4.00

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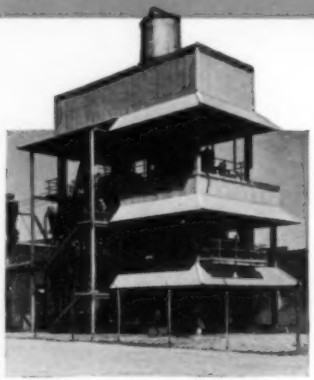

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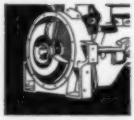

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